This magazine is published to promote sound thought upon and concerning industrial medicine and traumatic surgery. To that end it will contain articles, news items, reports, digests and other presentations, together with editors' comments. The editorial policy is to encourage frank discussion. On this basis contributions are invited.

Industrial Medicine

Reg. U. S. Pat. Off.

The editors will exercise care in checking on the accuracy of data printed, but in all other respects articles and opinions of which expression is allowed are the opinions of their authors—the editors reserving in all cases the right to comment on the same, in the current or any subsequent issues, as they may be inclined.

The Journal of Occupational Diseases and Traumatic Surgery

The Science, the Law and the Economics of Industrial Health

Volume 7 MAY, 1938 Number 5

Significance of Selenium

—As an Industrial Hazard—

H. C. DUDLEY,*
Associate Bio-Chemist,
U. S. Public Health Service

THE various phases of selenium poisoning in so far as they affect agricultural activities have been summarized by Byers[7] and Stenn.[16] This recent work has brought to the attention of investigators the possible industrial hazards associated with extraction and processing of selenium, selenium-bearing materials, and various inorganic and organic compounds of the element. Hamilton (1925) reports[8,9] that the examination of workers at a copper plant, employed in extracting and purifying selenium, revealed symptoms indicative of selenium poisoning. The author has shown (1936) that men in similar work excrete selenium in the urine[4] and exhibit symptoms similar to those noted by Hamilton.

From the results of investigations of the acute and chronic effects of ingestion of selenium compounds by animals[3,7] and the pathological changes brought about by inhalation of hydrogen selenide,[6] it is logical to conclude that when selenium in soluble or unstable combination, in sufficient quantity, gains entry to the organism, either by inhalation or ingestion, injurious effects will be produced. Prolonged absorption of sub-lethal amounts of such compounds will produce organic changes which are due primarily to the selenium absorbed.

The primary purpose of this paper is to point out those industries which may have unrecognized hazards due to the processing of selenium-bearing materials. The necessity of studying individual conditions in order to preclude the possibility of industrial poisoning is of greatest importance.

The increasing uses and applications of the element and its compounds necessitate a warning that selenium in certain combinations is toxic. Certain processes may be expected to prove injurious to those employed in plants utilizing the element unless adequate protective measures are taken.

Industrial Significance of Selenium

THE chief source of selenium used in commercial quantities has been that derived as a by-product from the electrolytic refining of copper. A study of trade literature shows that the first uses of selenium were largely confined to the glass and ceramic industry, as glass decolorizers, and in the production of red glass and glazes. Later, the rubber manufacturers made such demands on domestic copper refineries that selenium was no longer a drug on the market, large stores from former years being necessary to meet increased demands. The element has enjoyed an increasing demand during the past few years to such a degree that domestic supplies are unable to meet domestic requirements. (Table I.)

TABLE I
U. S. PRODUCTION AND CONSUMPTION OF SELENIUM*

Year	Sales of Domestic Produced Selenium (lbs.)	Imports of Selenium (lbs.)	Domestic Consumption (lbs.)
1921	55,978	1,106	57,084
1923	127,174	940	128,114
1925	194,007	5,807	199,814
1927	284,508	15,286	299,794
1929	344,288	3,592	347,880
1931	292,234	2,189	294,423
1933	331,963	1,755	333,718
1935	232,831	179,331	412,162

* U. S. Bureau of Mines Inf. Circular 6317. Minerals Yearbook 1934 and 1936.
(Prices of selenium average approximately $1.80 per lb.)

In the past eight years, new processes utilizing selenium have been developed, as evidenced by the increased number of U. S. and foreign patents. These new applications (Table II), coupled with

TABLE II
USES OF SELENIUM

Glass Decolorizer
Production of Ruby Glass
Red and Yellow Glazes
Paint and Ink Pigments
Production and Coloring of Plastics
Alloying of Machineable Stainless Steels
Alloying of Free Machining Copper Base Alloys
Rubber "Accelerators" and Anti-oxidants
Fireproofing of Electric Cable
Photoelectric Apparatus
Chemicals

* From the Division of Industrial Hygiene, National Institute of Health.

the steady increased use by the ceramic industry, have exhausted present domestic supplies, necessitating the importation in 1935 of 179,000 pounds of selenium.

In order to meet increasing demands for the element, it will be necessary to open new sources of supply. Because of the chemical similarity of sulfur, selenium, and tellurium, it is known that sulfide ore deposits will, in general, contain selenium and tellurium in small amounts. The processing of these sulfide deposits may result in varying quantities of these elements as by-products. Development of methods of extraction of the selenium from various minerals (Table III) and waste products may be expected to increase the supply of the element to keep pace with the increasing demands.

TABLE III
SELENIUM CONTENT OF CERTAIN MINERALS*

Material	Selenium ppm	Location
Cretaceous Shale (Pierre)	103	Nebraska
Cretaceous Shale (Pierre)	23	Kansas
Cretaceous Shale	23	Colorado
Cretaceous Shale	57	Arizona
Cretaceous Shale (Niobrara)	55	Wyoming
Cretaceous Shale (Niobrara)	22	Wyoming
Cretaceous Chalk	30	South Dakota
Cretaceous Limestone	26	Nebraska
Crude Sulfur	8,350	Colorado
Salt Crust	260	Colorado
Pyrites	55	South Carolina
Pyrites	75	Alabama
Pyrites	205	Nebraska
Pyrites	125	Virginia
Pyrites	250	Georgia
Copper Ore	7	Utah
Copper Concentrate	365	New Mexico
Lead Concentrate	385	Utah
Zinc Ore	430	Colorado
Tellurium Ore	430	Colorado
Vanadium Ore	125	Colorado
Tiemanite Ore	13.2%	Utah

* Reference 7.

In an excellent resume of his and others' work on the distribution of natural-occurring selenium, Strock[12] states that the selenium content of the earth's crust approximates 0.005%. From detailed geological and mineralogical considerations, the conclusion is drawn that selenium may be expected in nearly all sulfur and sulfide ore deposits, with selenium-sulfur ratios from 1:10,000, an average value being 1:1600.

Selenium has been reported in phosphate rocks from both foreign and domestic deposits. In general, certain western phosphates show greater amounts of selenium, ranging as high as 55 ppm.[13] It is also stated that selenium is volatilized completely when certain phosphates are calcined in the presence of water vapor.

While investigating the selenium content of a large number of soil samples, Byers made a most interesting observation as the result of certain determinations on soils taken from areas surrounding smelters. "A number of samples of soils and vegetation from areas subject to smelter fumes were examined. These include areas near Butte and Anaconda, Montana; Kennet, California, and Copper Hill, Tennessee. In all cases selenium was found and in general a decrease in quantity as the distance from the smelter increased. This matter deserves fuller investigation.[7, page 74, T. Bull. 530.]

Toxicity of Selenium

THE experimental work by a large number of investigators on the effects on animals of ingested selenium compounds has shown conclusively that soluble selenium compounds are both acutely and chronically toxic. The toxic effects of such ingestion, above very low threshold limits, are in direct proportion to the amount of selenium compound consumed. The acute effects of ingestion of soluble selenium compounds may be summarized as consisting primarily of early cellular destruction in the liver, with later pathological changes throughout the organism. The effects of ingesting small quantities of selenium compounds over a long period result in retrograde changes in the liver and kidneys, accompanied by general debility.

The reported experimental work on the effect of inhalation of selenium or its compounds is confined to the work done on the effects of inhalation of hydrogen selenide.[6] Acute and sub-acute effects resulting from single exposures of guinea pigs to hydrogen selenide are, primarily, an early severe fatty metamorphosis of the liver and late hypertrophy of the spleen.

The effects of industrial exposures have been reported by Hamilton[8,9] and the author.[4] These investigators report the following symptoms occurring in certain of the men employed at copper refineries extracting or purifying selenium: pallor, gastro-intestinal disturbances, garlicky odor of breath and perspiration, irritation of nose and throat (rose cold), coating of tongue, metallic taste in mouth, and nervousness.

The symptoms given above are not pathognomonic for selenium and are characteristic of metallic poisoning in general. However, an analysis for selenium in urine from workers who are suspected of being poisoned by the element should be made.[1,2,4] This confirmatory urine analysis is reported for those men observed by Dudley.[4]

The excretion of selenium in the urine is conclusive evidence that workers are absorbing selenium. However, more clinical and experimental laboratory work is necessary in order to establish a method of differential diagnosis, based on the quantity of selenium excreted in the urine.

Possible Sources of Selenium Hazards in Industry

IN TABLE VI are shown the industries that are manufacturing or processing selenium or selenium-bearing material. For convenience in discussion, these industries have been divided into Primary and Secondary classes. The Primary group includes those industries which extract, mine, treat, or process natural-occurring minerals which contain, in some cases, selenium in appreciable quantities. The Secondary group includes those industries which utilize selenium and selenium compounds as basic materials in manufacturing processes.

The processes which on casual inspection may be expected to afford hazards to the worker are

listed in Table IV. The information presented is merely intended to designate potential hazards. Only by an environmental survey, with sampling of workroom atmosphere for selenium contamination, can there be any authentic evaluation of the occupational hazards inherent in any of the industries or processes listed. Methods of sampling air-vapor concentrations have been developed.[5,6] Dusts may be collected for chemical analysis[1,2,5] by several approved methods.[11]

Toxicological Aspects of Hazards Due to Selenium

LITTLE is known of the toxic properties of selenium and its compounds in so far as this knowledge applies to industrial problems.

Those processes which on casual inspection appear to present hazards have been discussed in the foregoing (Table IV). As has been previously stated, the purpose of this paper is to point out the possibility of the existence of such hazards in certain industries in order that those charged with hygienic control will be in a position to recognize the hazards and the possibilities of their elimination.

Table IV
Industries and Their Possible Selenium Hazards

Industry	Source of Hazard	Type of Hazard
Primary Industries:		
1. Copper	Ore Concentrate and Flue Dusts, Sludges	Se, SeO_2 and Mixed Dusts
2. Lead and Zinc	Ore Concentrate and Flue Dusts, Sludges	Se, SeO_2 and Mixed Dusts
3. Pyrites Roasting	Roasting Towers, Sludges	Mixed Dusts, Se
4. Lime and Cement (Certain Areas)	Dust, Kiln Gases	Mixed Dusts, SeO_2
Secondary Industries:		
1. Glass, Ceramics	Melting Pots and Furnaces	Fumes of Se, SeO_2
2. Rubber	Vulcanizing and Curing Processes	Organic Vapors, H_2Se
3. Steel and Brass	Alloy Furnaces	Dusts, Se, SeO_2, Fumes
4. Paint and Ink Pigments	Pigment Compounding and Mixing	H_2Se, SeO_2, Soluble Dusts
5. Plastics	Mixers, Presses	Organic Vapors
6. Photoelectric	Melting and Casting Operations	Vapors, Se, SeO_2
7. Chemicals	Mixing, Melts, Synthesis	Se, SeO_2, H_2Se, Organic Vapors

The extent of the hazard existing in industries where selenium is present is due primarily to the types of processes being carried out. Dusts, fumes, vapors or liquids may result in definite hazards, the scope and degree of which are dependent upon the processes in progress and the protective devices used to dissipate the noxious materials. The dusts may be of such composition that on inhalation no soluble selenium compound is liberated. Soluble dusts, such as SeO_2, SeO_3, H_2SeO_3, H_2SeO_4, and certain halogen compounds may prove toxic because of the ease by which they are absorbed both by the lung tissue and from the alimentary tract. Selenium vapors may consist of certain of those soluble dusts listed because of their relatively high vapor pressures at ordinary temperatures. However, the most noxious vapors may be expected to include organic compounds, i.e., methyl selenide, ethyl selenide, aromatic selenides, etc., as well as hydrogen selenide.

Absorption of organic selenium compounds through skin contact has not been studied experimentally. However, it has been shown that burns resulting from hot acids containing selenium as the bromide resulted in the appearance of selenium in the urine of the person so affected within two days.[4] Selenium oxychloride produces fatal burns on rabbits, the selenium making its appearance in the blood and liver within two hours.[15]

The toxic effects of selenium compounds may differ with the mode of entry into the body. Inhalation of vapors will provide entry to the organism at the alveolar surfaces, as will entry of soluble dusts and dusts which are rendered soluble by phagocytic action. Ingestion of selenium-bearing material as a secondary result of inhalation may be occasioned by expulsion of such material from the respiratory tract. However, it must be stressed that cleanliness of habits and care at meal times are necessary to prevent ingestion of dirt from the hands. It is possible that absorption of organic liquids through the skin may provide an entry for the element, as on handling solvents or plasticizers, particularly at higher temperatures.

In determining the possibility of selenium poisoning, the occupational environment must be considered. If men are exposed to selenium fumes or dusts, and evidence symptoms indicative of metallic poisoning, further confirmatory tests are evidently necessary in order to establish whether selenium is being absorbed. A thorough medical examination of the worker, accompanied by clinical laboratory studies, is suggested. An analysis of the 24- or 48-hour output of urine for selenium[1,2,4] is recommended as a confirmatory test. Normal human urine contains no detectable quantities of selenium. However, it must be pointed out that persons living in certain regions[10] show quantities of selenium in the urine due to consumption of locally-grown foodstuffs which contain selenium. Local water supplies contaminated by selenium may account for its appearance in the urine of persons residing in certain areas.[14]

The foregoing considerations have clearly shown that selenium presents potential hazards of such degree that further study is warranted. The adoption of control measures is suggested in order to protect workers from injurious effects as the result of absorption of seleniferous materials.

Summary

THIS paper points out and discusses those industries which may have unrecognized hazards due to the processing of selenium-bearing materials; including lead, zinc, copper smelters, and refineries. The principal users of selenium are

shown, and include producers of ceramics, paint pigments, special steel, and copper alloys, as well as rubber and rubber specialties.

Bibliography:

1. Robinson, W. O., Dudley, H. C., Williams, K. T., and Byers, H. G.: Determination of Selenium and Arsenic by Distillation. *J. Ind. Eng. Chem., Anal. Ed.*, 6, 274, 1934.

2. Dudley, H. C., and Byers, H. G.: Determination of Selenium in Animal Matter with a Clinical Test for Urine. *J. Ind. Eng. Chem., Anal. Ed.*, 7, 3, 1935.

3. Dudley, H. C.: Toxicology of Selenium. I. A Study of the Distribution of Selenium in Acute and Chronic Cases of Selenium Poisoning. *Am. J. Hyg.*, 23, 1, 169, 1936.

4. Dudley, H. C.: Toxicology of Selenium. II. The Urinary Excretion of Selenium. *Am. J. Hyg.*, 23, 1, 181, 1936.

5. Dudley, H. C.: Toxicology of Selenium. III. Determination of Selenium in Air-Gas-Dust Mixtures. *Am. J. Hyg.*, 24, 2, 227, 1936.

6. Dudley, H. C., and Miller, J. W.: Toxicology of Selenium. IV. Effects of Exposure to Hydrogen Selenide. Public Health Reports, 52, 1217, 1937. Reprint No. 1855.

7. Byers, H. G.: Selenium Occurrence in Certain Soils in the U. S. with a Discussion of Related Topics (See Bibliography) 1935—U. S. Dept. of Agriculture Tech. Bull. No. 482. 1936—U. S. Dept. of Agriculture Tech. Bull. No. 530.

8. Hamilton, A.: Industrial Poisons in the United States. Macmillan Company, New York, 1925.

9. Hamilton, A.: Industrial Toxicology. Medical Monograph. Harper and Brothers Publishing Company, New York, 1934.

10. Smith, M. I., Franke, K. W., and Westfall, B. B.: The Selenium Problem in Relation to Public Health. Public Health Reports 51, 44, 1496, October 30, 1936.

11. Bloomfield, J. J., and DallaValle, J. M.: The Determination and Control of Industrial Dust. U. S. Public Health Service Bulletin No. 217, 1935.

12. Strock, L. W.: Distribution of Selenium in Nature. *Am. J. Pharm.*, 107, 4, 144, 1935.

13. Rader, Jr., L. F., and Hill, W. D.: Occurrence of Selenium in Phosphates. *J. Agri. Research*, 51, 12, 1075, 1935.

14. Williams, K. T., and Byers, H. G.: Occurrence of Selenium in the Colorado River and Some of its Tributaries. *J. Ind. Eng. Chem., New Ed.*, 13, 353, 1935.

15. Dudley, H. C.: Toxicology of Selenium. V. Toxic and Vesicant Properties of Selenium Oxychloride. Public Health Reports, 53, 94, 1938.

16. Stenn, Frederick: "Alkali Disease" Selenium Poisoning. A Review. *Arch. Path.*, 22, 398, 1936.

Management of Eye Injuries

M. F. Cochran, M.D.,
Newnan, Georgia

FIRST I wish to classify these injuries as: simple, severe, external, and perforating.* In simple injuries would be the ordinary foreign body which is driven into the cornea, such as occurs to the track laborer or the shop workman as the simple grain of sand, or the cinder which blows into the eye from a passing train. This foreign body is usually found beneath the upper lid. In the case of the shopman it is driven beneath the lid and lodged into the surface of the cornea, like emery dust or a fine particle of metal from an anvil.

I would impress the need of having a light which shines upon the surface of the eye, and always using a magnifying glass or binocular-loupe for inspection of the cornea. A good light will prevent mistaking an iris pigment, which sometimes shines through the cornea, from a corneal foreign body. I suggest the use of mercurochrome 2% or flourescein 2% solution instilled into the eye to stain the surface of the globe; this identifies the situation of the foreign body or abrasion. Many foreign bodies so identified can be removed by instilling a few drops of 2% cocaine solution or 2% butyn solution into the conjunctival sac, and then, with a single flick of a toothpick or applicator wrapped in cotton and moistened with water or cocaine solution, flicking them off the cornea.

Foreign bodies are so frequently imbedded in the cornea because the cornea occupies nearly two-thirds of the space between the open eyelids, and a much larger proportion of that space when the eyes are partly closed, as they are when the entrance of a foreign body is anticipated.

Again, the tissue of the cornea is of such a consistency as to retain such particles as may penetrate it, whereas the conjunctiva and sub-conjunctival tissues are so loose that foreign bodies imbedded in them easily work out.

When a foreign body is imbedded in the cornea, it commonly causes irritation and suppurative inflammation, by which it becomes loosened and easily drops out, or is wiped away by the lids. If, however, it lies at the bottom of a considerable loss of substance, it may lie there for some time, although quite detached from the corneal tissue. Under these circumstances it becomes a source of irritation, causing chronic weakness of the eye, photophobia, and excessive lachrymation, and the development of vessels in the adjoining part of the pericorneal space, which push out to the seat of the foreign bodies, giving an appearance of a chronic phlyctenular ulcer or superficial vascular keratitis.

THE search for the foreign body in the cornea should be made by the following methods:

As to examination, oblique illumination should be employed, using the ophthalmoscope if possible, with the eye placed so as to reflect from its surface an area of light, as before a large window. If the foreign body has been imbedded many hours or days, there also will be a pericorneal redness, most decided as to the part of the corneal margin nearest the foreign body. In using oblique illumination, foreign bodies of light color are rendered evident when the light is strongly concentrated on the cornea and the iris is in comparative shadow. Dark particles are rendered distinct by concentrating the light on the iris behind, thus furnishing a light background. Light foreign bodies are best seen against the black pupils; dark ones against the illuminated iris. It is necessary, therefore, to vary the oblique illumination and to look at the cornea from different directions.

With the ophthalmoscope all opaque foreign bodies appear black against the red reflex from the pupil. By turning the eye in different direc-

* Presented at the Eighteenth Annual Meeting of the Surgical Association of the Atlanta and West Point Rail Road, the Western Railway of Alabama, and the Georgia Railroad, Atlanta, March 24, 1938.

tions, this reflex must be obtained through different parts of the cornea. Sometimes with the ophthalmoscope the appearance of a foreign body is caused by a slight disturbance of the corneal surface, so that, after the position of such a black speck has been ascertained, it must be examined by oblique illumination.

The reflection of an area of light, as a large window opening to the sky, or a strongly illuminated card held close before the eye, is uniform for the normal cornea. But when the corneal surface is roughened by the presence of a foreign body; the irregularity caused in the reflection is very noticeable, and furnishes the most readily applicable method of recognizing the presence and location of such an injury or foreign body. If, however, the disturbance of the surface be slight, it is liable to be masked by the layer of mucous which covers the normal cornea, and to avoid this source of error the corneal surface should be made dry by touching it with a bit of absorbent cotton. As before stated, by using a solution of flourescein, as for corneal ulcers, one may succeed in staining a small area, which shows where the foreign body is, furnishing a background against which it is more distinctly seen.

REMOVAL of particles imbedded in the cornea should always be done under strict aseptic conditions, with local anesthesia, concentrated illumination, and strong magnifying glasses. In using the knife or spud for obstinately lodged foreign bodies, it is well to try to get the instrument under the foreign body to lift it out; injury to the cornea should be minimized. Foreign bodies and abrasions can always be better seen if flourescein or mercurochrome solution is instilled and subsequently washed away with a bland irrigating solution of saline or boric acid.

If the particle had been lodged for some time, especially if it carried infection with it, the case then may be treated with irrigation, instillation of 20% argyrol solution or bichloride ointment, 1-3000, and watched for a day or two. But if there is ulceration, or the cornea is much injured, the pathologic tissue should be gently touched with phenol on a toothpick with a little cotton tightly twisted on its point; before applying it the excess is removed by touching to a piece of gauze. The measures mentioned above should always be followed by 1% atropine solution or ointment into eye. The eye should always be protected with a pad.

In general, foreign bodies lodged in the cornea should be removed at once. This is usually a very simple operation with the eye placed well under the influence of local anesthesia. As noted, a single drop of 2% solution of cocaine or butyn placed directly upon the cornea every two or three minutes produces the necessary anesthesia within five minutes. Occasionally a foreign body can be wiped away by a little cotton wrapped closely round the end of a probe or a wooden applicator. If more firmly imbedded, the ordinary spud is to be used by thrusting it into the wound alongside the foreign body, and, by something of a wedge-like action, pushing the foreign body out.

Foreign bodies of a certain character, as a splinter of wood or the beards of grain or grasses, may require to be extracted as a splinter is extracted from the skin, by making a nick incision along the foreign body with a needle, or corneal knife, so as to expose it, and then lifting it out of its bed. When the foreign body extends somewhat into the anterior chamber, the eye should be kept quiet until the aqueous humor has refilled the chamber. Then a broad needle is to be thrust underneath the foreign body and held with its point imbedded in the posterior surface of the cornea while the foreign body is extracted.

Occasionally, when the condition of the patient, or the lack of proper instruments or of a local anesthetic, renders the extraction of the foreign body impossible, it is proper to cleanse the surface of the eye as thoroughly as may be done, and allow it to remain for a few days until the process of suppuration has loosened it. Then it can be washed or wiped out. But such a process is always attended with danger of infection of the deeper structure of the eye, and serious damage or complete functional loss of the organ.

Bits of iron imbedded in the cornea very quickly give rise to a brown stain, probably due to oxide of iron. This stain may remain after removal of the foreign body, but it is nearly always cast off within a few days. It is better to remove it at once by scraping, as it often proves a source of irritation and always separates as a slough.

For the perforating foreign bodies with the more severe injuries, I advise the use of atropine when first seen by the local surgeon, application of a snug dressing, and immediate transportation to the nearest company oculist. If the foreign body is suspected to be a sharp flake of steel or any other metallic foreign body, I order an x-ray picture immediately, and if the foreign body is within the globe, I request a specimen of the steel or metal from which the foreign body came, to determine if it has magnetic attraction. Early surgical procedure is necessary on this type of injury, and the use of a magnet is essential in extraction. I do not believe in rushing to remove a globe in any type of injury unless the globe was entirely destroyed and then I always have someone besides myself to inspect it for future protection. Immediate determination of the vision of the uninjured eye is important. Sometimes patients will learn to feign sympathetic interference and obtain more costly settlements. In these more severe injuries I think the use of foreign proteins has its place. I never tell a patient he does not have a foreign body. A sharp spicule of steel can penetrate the globe through the cornea and the smooth wound can hardly be seen, and no inconvenience is suffered until haziness appears many hours or days later from a traumatic cataract or vitreous opacity.

ANOTHER thing to which I would like to call attention is burns:

Heat, acids, or caustics may cause corneal ulcers and permanent irregularity of cornea and opacities. A burn by heat or by nitric acid may cause a superficial coagulation of the corneal tissue, giving an impression of complete opacity of the membranes; but upon the separation of the injured tissue, which may occur in a few hours or few days, the cornea is found to be clear and comparatively uninjured. Burns by lime are frequent, and very serious in their effects, the lime forming a union with the tissue which makes it difficult to remove and, therefore, it continues to act as a caustic for a considerable length of time.

Simple burns by steam, or hot metal after removal of the metal, should be treated by keeping the eyes closed under a light bandage and cleansing twice a day with boric acid solution and instillation of butyn-picric acid ophthalmic ointment. Injury by quicklime may be met by the filling of the eye with olive oil; this kind of injury especially requires the earliest possible removal of all the retained caustic. Other caustic alkalies may be neutralized by very dilute acids, as vinegar and water, but reliance should be placed mainly on washing with water or a solution of boric acid.

Acids may be neutralized by lime water, or solutions of sodium or potassium bicarbonate, or soapsuds. But the best means is by freely washing the conjunctiva with a 1% solution of bicarbonate of soda.

Conservative Surgery

—*In Hand Injuries*—

J. S. HOLDER, M.D.,
LaGrange, Georgia

UNTIL the last decade, severe injuries of the fingers, such as complicated fractures, crushing wounds with tendon injuries constituted an indication for the removal of the member rather than attempt to preserve the finger by conservative treatment.* But experience has taught us that it is very important to save any part of a finger, if a well covered and non-tender stump can be provided. This is particularly true in the laboring class, because the breadth of the hand must be preserved, with as much of the gripping power as possible, for efficient work.

The first requirement in the treatment of the injured hand is to control bleeding. If the wound is only oozing, manual pressure with sterile gauze will suffice. If a single artery is bleeding it can be caught with a sterile hemostat; but if bleeding is profuse, a tourniquet can be applied to control it.

After the bleeding is controlled the hand is carefully examined to ascertain the extent of damage. If this is not done it leads to an incomplete diagnosis and, as a result, an incomplete operation.

Preparation of the field is the same whether the injury is extensive or slight. The wound is covered with sterile gauze and a wide area around the wound is shaved, and cleansed thoroughly with soap, water and ether, if the hand is greasy. After the toilet of the surrounding tissue is completed, the gauze is removed from the wound and it is gently cleansed with soap and water, then the wound is washed out with sterile saline solution and the adjacent skin painted with iodine or metaphen. No antiseptic is placed in the raw area, for it is more harmful to the tissues than the good it does. Except for the smaller wounds an anesthetic is necessary for adequate treatment.

IN CASES involving only the skin and subcutaneous tissue:

After the field is prepared, all the devitalized tissue is removed with a sharp scalpel beginning at the deepest layers, care being taken to avoid leaving foreign bodies that may be buried in the tissues. Although complete debridement is essential, too much healthy tissue should not be removed, because an extensive defect may give rise to tension during the suture. Especially in injuries of the fingers, every tension must be avoided if possible, so that the function remains unimpaired.

Where large defects occur and it is questionable whether all devitalized and contaminated tissue has been removed it is best to splint the hand, apply a sterile dressing, and treat with continuous wet dressings of sterile boric acid or weak Dakin solution for 24 to 48 hours. If no infection develops then the denuded area can be covered with a skin graft.

INJURIES with tendon involvement:

Extensor tendons of the dorsum are more frequently injured than those of the palm. This is indeed fortunate for both the patient and the doctor, because the percentage of healed flexor tendons is considerably less than extensor tendons, since tendons surrounded by sheaths are more vulnerable than the ones surrounded by areolar tissue.

A number of factors must be considered in tendon repair. If the wound is clean, the hand seen immediately, and the tendons are not covered by sheaths, then immediate repairs can be done. The tendons should be caught with fine tweezers and sutured end to end, if possible, with interrupted sutures of very fine silk, the subcutaneous tissue closed with very fine catgut and the skin sutured with interrupted sutures of silk or dermal.

An immobilizing bandage is then applied in such a manner that only a minimum tension is placed on the repaired tendon. Slight voluntary movements are begun in one week, and gradually increased to fairly strong movements in three weeks. At this time the splint can be removed.

In cases in which there is a possibility of infection or there is a delay in seeing the injury, Koch thinks it is wiser to close the superficial wound loosely with a few interrupted sutures and permit healing to occur before attempting a repair of

---

* Presented at the Eighteenth Annual Meeting of the Surgical Association of the Atlanta and West Point Rail Road, the Western Railway of Alabama, and the Georgia Railroad, Atlanta, March 24, 1938.

the injured tendons. He is particularly conservative about attempting the immediate repair of tendons surrounded by a sheath.

Injuries involving bones and joints:

The principles of treatment do not differ from those involving the bones and joints in other parts of the body. In splinting a fractured phalanx it is important not to immobilize the entire hand in order that stiffness and limited motion may be kept at a minimum.

In cases of partial losses of fingers it is necessary that the bone be covered in the proper manner and the tendons treated properly. After the field is prepared the bone is removed with forceps, and tendons fixed to the periosteum. This is followed by several catgut sutures, in the subcutaneous tissue, then it is covered by a flap obtained from the fleshy surface of the digit. The flap must be sufficiently large so no tension is present when sutured.

In conclusion, I wish to mention briefly:

Infection following injuries:

In 1,600 cases of hand infections studied by Mock a major portion were the results of minor accidents such as pinpricks, splinters, abrasions, nail wounds, and scratches from tin and wire. The frequency is due to inadequate first aid, failure to report to the surgeon and self administered treatment by the worker.

In the presence of wound infection by pyogenic organisms it is essential to secure free drainage, by opening the wound widely and bringing about a localization of the infection. This is best accomplished by immobilization of the infected area, applications of warm wet dressing and elevation of the affected part.

Eighth International Congress

THE Eighth International Congress of Industrial Accidents and Occupational Diseases is to be held at Frankfort-on-Main, September 26-30, 1938. The President of the Congress is Prof. Martineck, of the Prussian Ministry of Labour. The Secretary-General is M. Bauer, Adviser of the same Ministry.

The Congress will consist of three Sections:

1. Industrial Accidents, the principal subjects being: (a) Injuries to the peripheral nerves with the exception of the sympathetic system; and (b) Foot injuries.

2. Section of Occupational Diseases, in which the principal discussions will be: (a) Occupational diseases other than silicosis and asbestosis; an introductory report being given by Prof. Gerbis of Berlin; (b) Injuries due to solvents, a report being given by Prof. Flury of Wurzburg.

3. Combined Sections: The subject to be discussed is Importance of Predisposition and Wear and Tear in relation to occupational accidents and diseases.

It is expected that a group of members of the Permanent Committee for America will attend the Congress. Dr. R. R. Sayers of the U. S. Public Health Service, is President of this Group, and several papers are expected.

Radiographs of Sixty Cases of Silicosis

M. Conrozier,
Senior Internist to Hopitaux de Lyon,
and
J. Magnin,
Senior Internist to Hopitaux de Saint Étienne (France).

(From Archives d'Électricité Médicale et de Physiothérapie du Cancer, Bordeaux, December, 1936.)

Translation by
Emery R. Hayhurst, M.D.,
Columbus, Ohio

FOLLOWING the Occupational Disease Conference held at Lyon in 1929, the authors began an intensive study of pneumoconiosis among the miners of the Gard basin (in Southeastern France). There were noted the decidedly opposing opinions expressed at the Lyon's Congress (1929) by physicians like Dr. Irvine and Dr. Mavrogordato from the South African gold mines, who spoke decidedly of silicosis as an entity by itself, and the opposition of two well-informed Frenchmen, M. Rist and M. Doubrow, who contended that the negatives shown by the South Africans were more or less tuberculosis modified by silica. Numerous publications by Rist, Policard, and Doubrow have been to this same effect.

Knowledge of the bad reputation of the effects of stone-working in the Gard basin instigated the present examination of all stone miners, beginning in 1929, when two cases were presented to the Society of Radiology of the Southeast and the next year when a score of films were shown to the same Society at Nice. To date, 60 cases have been x-rayed and 50 were shown in photographs in *La Medicine du Travail*, in January, 1936. Likewise the Academy of Medicine has recently honored the writers by sending a Commission to whom 20 of the patients were presented.

One of these miners presented to the latter Commission was expectorating bacilli, and inoculations with homogenized sputa into guinea pigs were negative. Accordingly the authors are convinced of the autonomous nature of silicosis, and the laboratory has confirmed them in their position. In addition to this, x-ray and clinical observations have also been very confirmatory.

These patients in no way resemble tuberculosis cases. Many of them are perfectly vigorous, have lost no weight, and all are apyretic. They are essentially short of breath—a progressive shortness of breath—and show almost nothing on auscultation, even breathing sounds being practically absent. They appear to be preyed upon by an intense mechanical dyspnea which invaginates the chest above the clavicles and in the subclavicular areas, depresses the intercostal spaces, and raises the shoulders. They breathe like asthmatics in ex-

---

* Apropos des radiographies de sioxante cas de silicose.

treme, offering to the ear a chest without the least presence of rales or abnormal sounds. The breath sounds appear as though coming through an eider-down coverlet.

The majority of the cases present massive images of dense and extended shadows. Others, uniquely, present a seed-plot of nodular shadows in a felting of sclerosis. Still others show more or less unequal association of massive images with nodulation punctuating the woof of the sclerosis. While it appears superfluous and perhaps ill-advised to attempt to classify them, there appear to be three forms: tumoral images, nodular images, and mixed images.

The question arises whether the diagnosis of silicosis can be made from a single x-ray picture. The South Africans have declared in the affirmative. Radiologists, in the majority of cases however do not wish to confirm silicosis by the inspection of one negative. Nevertheless, there are a certain number of the negatives in which the radiologist must consider silicosis and make a diagnosis from it. Here, for example, are seen several massive images with very clean-cut contours lying like strange voluminous bodies in the parenchyma (seven pictures of such are shown in the original article). Sometimes these are so dense that only thinner bands of tissue are pervious to the x-ray. From the time that this disease begins among these stone workers, there is nothing suggesting tuberculosis about the picture and these types are definitely the most affected. From this it may be possible that the less serious cases are also not tuberculous, and that dust in itself and not bacilli is responsible for the malady. Still it is not insisted that these (less serious cases) be labelled definitely silicosis.

IN DIAGNOSIS, these tumoral images should be differentiated from other intrathoracic tumors. Obviously primary cancer of the lungs suggests itself. This affliction, however, is unilateral although lymphosarcoma may be bilateral and continuous with the mediastinum. However, in these stone workers the masses are detached from the mediastinum. Metastatic cancer from other origin, most often the breast, is also ordinarily unilateral (at first) with rapid extension. Sarcomatous metastases are quite often bilateral but the rounded forms of these tumors, suspended in a perfectly sound parenchyma, are characteristic. Cysts are often unilateral but their shape, their proneness to be found in the bases, and the perfect condition of the surrounding lung differentiates them. Pulmonary syphilis is rare outside of a dilatation of the bronchi and is very likely to produce a form of peribronchial sclerosis. Pulmonary gumma is a unilateral rarity. Mycoses are simply mentioned.

Some of the massive shadows of these stone workers, however, give the impression, from the negative, of a chronic inflammatory infection leaving the surrounding parenchyma intact, such as, in particular, encysted pleurisies with auxillary pachypleuritis, and pleural calcifications. In general, the bilateral character of these silicotic injuries, their location, and the fibrosis which always accompanies them, remove doubt concerning them.

Indeed, one is able to make the diagnosis of silicosis in them from the nature of the tumoral images seen in the x-ray picture alone, without seeing the patient and without knowing of him otherwise. A certain number of them could recall no other affection than silicosis.

In regard to the nodular forms and mixed forms (of nodules in a warp of sclerosis), the authors recognize that the claim is made that tuberculosis could produce all of the shadows ordinarily attributed to silicosis and, even with stereoscopic negatives, it is sometimes impossible to differentiate them. This is especially true for the nodular forms, which constitute the basis for Rist's and Doubrow's opposition to nodular silicosis as distinct from miliary tuberculosis. However, the detailed picture shows more extensive felting of peribronchial sclerosis in silicosis, while the great rarity of generalized bilateral true miliary tuberculosis as compared with the frequency of nodules in these patients is called to mind. Furthermore the authors do not need to stress the astonishing feature that so many of these stone miners incur a "miliary tuberculosis" type of picture and yet, despite the extremely laborious nature of the work, they are able to continue at such for some years and then to quit work with every external evidence of perfectly sound health except dyspnea.

Recourse should be had to the clinic to distinguish between silicosis and tuberculosis. The authors would be glad to place some of their robust nodular silicotics beside patients suffering from miliary tuberculosis and have them examined in regard to temperature, blood sedimentation and, if any further doubt remained, to submit both groups to the decisive trial of working upon the rock.

As respects the mixed forms showing massive lesions, which enclose seed-plots of nodules, one would not wish to make the diagnosis from the stereoscopic negatives alone but to resort to clinical observations.

There should be kept in mind the following observations:

1. The characteristic bilaterality of the massive lesions;

2. The importance and appreciation of the surrounding fibrosis which manifests itself not only by thickened perivascular projections but by definite bands of fibers—in particular, thick vertical streaks from the masses down to the diaphragm to which they appear to be attached;

3. The definite clean-cut appearance of the nodules as compared to the "bread-crumb" images of tuberculosis; and

4. The frequent, very striking deformations of the diaphragmatic domes (with shadows in vague ridges). While none of these characteristics is specific for silicosis and the sclerogenic powers of tuberculosis are known, still silicosis appears especially to show the trends noted.

Tuberculosis destroys more than it builds, while silicosis builds extensively and does not destroy.

Resort to the clinic, however, is necessary to decide between the two possible interpretations. For those who observe the patients, all things being equal, nothing among these stone workers recalls tuberculosis, and reciprocally. A bilateral tuberculosis, swarming with lesions about the principal foci, is a *cachectique* who is more or less febrile and, despite the quibbling of terms, one in whom the process of denouement cannot be stopped, while its auscultation is rich in signs of softening.

On the other hand these silicotics, some of whom have been followed for years and in whom these x-ray lesions are intense, have continued to work with these fibrous nodules enclosed in each lung. Many of them maintain for a long time a habitus and state of excellent physical condition. A few finally became cachetic, little by little, without fever and finally preyed upon by the intense mechanical dyspnea described, which appears like respiratory obstruction. Such, the authors believe, is a characteristic picture of silicosis. Even with their disabling asthmatic dyspnea, they are not definitely ill, but have an accelerated breathing rate which lacks the prolongation of expiration seen in the asthmatic. Thus are seen some patients who look well-nourished and who have good hearts but who are incapable of taking a few steps without stopping because they are out of breath. Several have gone on for several years like this and are still living.

Insistence is not made on the significance of the silent auscultation found in these silicotics. Nothing has also been said in regard to cavities upon which some insist, and to which others take exception, which might occur without secondary tuberculization.

Thus, the authors believe it is possible to make the diagnosis of the usual forms of silicosis by taking into consideration both the clinical examination and the x-ray picture. Added to this it is to be recalled that silicosis is an occupational disease, but the point is not made of resorting to the occupation to make the diagnosis. Nevertheless, such is a precious additional item to the diagnosis and especially important in relation to mining. Hence, one wishes to ask the patient his trade to confirm the opinion, as in the case of a patient far from a mining center whose particular profession would be the decisive factor in diagnosis in regard to an x-ray picture whose interpretation was in suspense.

In the Gard region, where the artisan population, both rural and urban, far outnumbers the mining population and especially those working underground, similar lung pictures are not observed. Furthermore, of the laborers who work underground, the condition is unique among the stone miners. More precisely, the greater part of these miners in the Gard basin are sooner or later overtaken with silicosis. On the other hand, in this same region, tuberculosis is rare, and rare in particular among underground miners. The contrast between the extreme frequency of the grave pulmonary lesions among the stone miners and the rarity of tuberculosis among the coal miners may be said to settle the trade origin of the disease.

The significance of the role of dust is thus definitely fixed on the one hand, against the action of the bacillus on the other, in producing silicosis.

On this subject it is noted that among our silicotics some complications occur which are ordinarily seen in tuberculosis, for example, pneumothorax, but here again searches for the bacillus have been negative.

In summary, we see little of tuberculosis among our silicotics based also upon laboratory authentication in 22 cases who did not expectorate the bacillus (most of whom had several examinations and one to several inoculations in guinea-pigs). There was revealed the presence of the bacillus in four out of 50 patients upon whom we were able to conduct research, and here the importance of the laboratory is demonstrated in confirming our conviction upon the autonomy of silicosis.

As regards silico-tuberculosis in the Gard basin, tuberculosis plays a purely episodic role among the silicotics. We have read that elsewhere in France complicating tuberculosis is more frequent and less easy to discriminate. Here no doubt the high content in silica of the rock of the Gard basin coupled with the rarity of tuberculosis among our (regular) miners has apparently enabled us to observe more characteristic cases of silicosis than those from other regions, and thus to appreciate more clearly the relations between the two diseases.

This double privilege has enabled us to assert the nosologic reality of silicosis and to present x-ray pictures which, we hope, offer an originality that will distinguish them among pictures of thoracic affections.

(Eight chest x-ray half-tones are included in the original article—seven with tumoral images and one, Figure 3, showing only the nodular type, in a man of 50 years with 10 years on the rock, several negative B.K.'s, vigorous and well-nourished, but recently compelled to retire because of dyspnea.)

Early Care of Injuries

—*The Elements of First Importance*—

J. C. Blalock, M.D.,
Atlanta, Georgia

A LARGE percentage of the work of the railway surgeon is of traumatic origin.* The length of the period of convalescence and the degree of permanent disability bear a rather close relationship to the type of early treatment employed. The patients as a rule are wage earners, and prolonged disability is costly to both employer and employee. Early rehabilitation, enabling the patient to resume his job as soon as possible, makes for better health and happiness, and the economic importance to all parties is tremendous.

The surgical principles concerned with wound

* Presented at the Eighteenth Annual Meeting of the Surgical Association of the Atlanta and West Point Rail Road, the Western Railway of Alabama, and the Georgia Railroad, Atlanta, March 24, 1938.

healing are familiar, but a review of certain more or less elementary facts will be presented in hope that it may serve a useful purpose and possibly bring to mind some points that may have slipped from memory.

In the management of wounds the main object of the surgeon is to promote the natural reparative process by preventing or eliminating any factor by which it may be disturbed.

Seven essentials must be employed if healing by first intention is to be obtained:

1. The arrest of bleeding.
2. Sterilization of the wound and its surroundings.
3. The coaptation of opposed surfaces.
4. Drainage, if necessary, in order to guard against the irritation and tension caused by retained blood clot or exudations.
5. Exclusion, by some form of antiseptic dressing, of all fresh sources of irritation and infection of the wound.
6. Rest to the injured part.
7. Maintenance of the general health of the patient.

If the above essentials are fulfilled, healing will occur promptly, although certain tissues take longer to heal than others—for example, divided nerve trunks may take a year to unite.

The rate of healing is further influenced by the part injured and the extent of the wound. The healing process may be modified by the presence of a foreign body in the wound. Occasionally, however, a wound may heal by first intention over a foreign body and remain healthy for months, or possibly, years.

But if the foreign body is non-absorbable it usually gives trouble sooner or later.

WOUND repair in individual tissues varies a great deal. For example, when a tendon is divided, the cut ends retract, leaving a gap which is speedily filled by blood clot. The clot organizes and adheres to the cut tendon and its sheath, leading to impaired movement and stiffness. Once this has happened, it is a very difficult problem to obtain restoration of function by subsequent operations, but the complication can often be avoided by bringing the divided ends into accurate opposition and securing them by suture. If the wound is obviously infected it is often desirable to delay the tendon repair until the infection has cleared up and the wound healed, because the cut ends may retract far enough to require enlarging the wound to locate them.

Unstriped muscle does not seem to be capable of being regenerated to any but a moderate degree.

If the ends of a divided, striped muscle are at once brought into opposition by stitches, primary union takes place with a minimum of intervening fibrous tissue. The musculi of the muscle fibers in close proximity to this young cicatricial tissue proliferate and a few new muscle fibers may be developed, but any gross loss of muscular tissue is replaced by a fibrous cicatrix. When a muscle is paralyzed from loss of its nerve supply and undergoes complete degeneration it is not capable of being regenerated even should the integrity of the nerve be restored. Thus its function is permanently lost.

Wounds of the stomach and intestine heal with great rapidity, provided the peritoneal surfaces are accurately opposed, but hollow viscera, like the esophagus and urinary bladder, in so far as they are not covered with peritoneum, heal less rapidly.

There is no trustworthy evidence that regeneration of the tissues of the brain or spinal cord in man ever takes place. Any loss of substance is replaced by scar tissue.

Fractures will not be discussed in this paper and the repair of bone will not be included.

THE question of amputation, however, will necessarily arise in dealing with the graver forms of lacerated wounds, although many limbs are now saved which in former days would inevitably be sacrificed. Hard and fast rules cannot be laid down as to when to amputate and when not to do so, each case must be treated on its own merits. The following general points must first be considered carefully: (a) The age and vitality of the patient; an old person has less recuperative power than a young one and the existence of general diseases such as diabetes, arteriosclerosis, albuminuria, might induce one to resort to radical rather than conservative measures; (b) the vitality of the extremity injured; and (c) the presence or not of infection, which, if it can be prevented, will greatly improve the chances of preserving the limb.

Amputation is certainly called for:

1. To trim the stump of a limb torn off by machinery, or cut off by a railway train, or blown off in an explosion.
2. Where the whole limb or a complete segment of it has been totally disorganized or crushed to a pulp although still retaining its connection with the body.
3. In cases where gangrene has supervened, especially if it is of the spreading type.
4. When severe infective symptoms develop in a case where an attempt is being made to save a limb, the retention of which from the first was doubtful.
5. In severe compound lacerations of the foot in old people, involving the bones and laying open the common synovial cavity.

Compound comminuted fractures, per se, do not require amputation unless very extensive; nor should laceration of the main artery of a limb necessitate its severance.

Astonishing results have been obtained with restoration of useful extremities by the use of tissue grafting.

BURNS are really a variety of open wounds. Deep burns contain a foreign body—the

burnt tissue. The disfigurement resulting from a burn is dependent upon the depth and extent and also upon the amount of infection that followed.

The heavy scarring which is often seen after a severe burn is the result of excessive inflammatory process due to a prolonged infection. The first indications in the treatment of severe burns are the treatment of shock and the relief of pain. There are many methods advocated for the care of the burn itself such as tannic acid, the salt bath, picric acid, paraffin, etc. All of these have their champions.

Without at this time going into the merits or disadvantages of each method, suffice it to say that the important point is to get the wound clean enough for skin grafting as early as possible, which will shorten convalescence, eliminate much of the pain and discomfort, and lessen the amount of contractures and permanent disability. If allowed to heal spontaneously, the reparative process is slow and painful, and the surface epithelium is thin, scaly, and easily irritated and not infrequently undergoes malignant change after a period of years. There is no other class of wound which can be so benefitted by the use of the skin graft.

ONE other type of wound deserves especial mention, namely, the wound that has been tattooed with carbon particles or pigment such as is seen so often in railway accidents. Unless this pigment is completely removed early there will be permanent tattooing which is unsightly, especially if on an exposed body surface. Such wounds should immediately be washed thoroughly by scrubbing with a brush and soap and water, if necessary under an anesthetic. It is a mistake to wait for healing to occur, because then it will be necessary to sacrifice the skin of the entire pigmented area, and thereby necessitate a skin graft which can be avoided by efficient early treatment.

I want again to state that no attempt has been made to introduce any new or original ideas in this discussion, which, of necessity, has been more or less rambling in nature. Reviews are always helpful, for it is so easy to forget certain principles that at one time were impressed in our minds, indelibly, as we thought, by our teachers and predecessors.

IN CONCLUSION, I would add, however, that when we have treated the patient successfully and are ready to dismiss him as sound physically, our mission is not ended, as in former years. We now have the benefit of the progress of science in the plastic field and should see that any disfiguring ravages of wound or burns are erased with as much zeal as we applied to the healing of the injured flesh or bone. Our work is not completed if we dismiss a patient as physically fit if he has to take up the duties of life with a mind sick from the consciousness of a disfigured body.

Pleural Effusion

—From Gasoline Inhalation—

Rutherford T. Johnstone, M.D.,
Los Angeles, California

THE presentation of a case of pleural effusion necessitates unusual phases to warrant attention.* Fluid within the pleural cavity has caused no particular comment in medical literature for the past several decades. Composite wordage gathered from the foremost textbooks all reads that it is secondary to some existing infection, either within the respiratory tract or elsewhere in the body. But when it comes out of a clear sky, not associated with any acute respiratory infection, attacking an apparently well individual, it should be considered as a symptom of tuberculosis until correctly and definitely diagnosed otherwise[1]. Primary or metastatic malignancy will, on occasion, cause pleural effusion. There are those infrequent cases of trauma also, where a direct stab wound or gun-shot wound will produce an effusion.

In contrast to these placidly accepted causes, the author wishes to present a rare case of sudden, moderately profuse, slightly hemorrhagic pleural effusion of non-bacterial, non-infectious origin. In addition, consideration of the provocative agent and the resulting phenomena induce interesting speculation.

Case History: William W., a white male, aged 31 years, was brought to the Golden State Hospital at noon on May 18, 1937, and was placed on the writer's service. His occupation was that of an auto mechanic. His employer accompanied him to the hospital. The following history was obtained: The patient worked on a night shift and at about 4:00 A.M., he was engaged in buffing a fender preparatory to painting it. Needing some gasoline to remove the fine dust particles which had accumulated, he attempted to siphon this gasoline from a large container to a smaller and more easily handled jar. Inserting one end of an "airline" hose, the diameter of which was over one and one-quarter inches, into the large container, the patient stretched on his right side on the floor and proceeded to start the flow by drawing or sucking the gasoline. The diameter of the hose was almost too large for the patient's mouth, and when the gasoline gushed through, he had great difficulty in removing the hose from his mouth. This time interval which occurred while he was struggling with the hose, together with the patient's position permitted a large quantity of gasoline to enter the patient's mouth; he estimated that a pint of gasoline "was swallowed." Undoubtedly, this was exaggerated. However, a fellow employee, upon inspecting the large container, estimated a similar amount, but allowance must be made for the residual amount in the hose. Both the patient and his fellow worker maintained that none of it was

* From the Department of Medicine, Golden State Hospital, Los Angeles, California.

"spit out," for by the time the victim got to his feet, he was strangling violently. The first sensation was that of burning of the throat. Within half an hour he experienced pain in his right chest, which he designated at the nipple area. This pain increased and within three hours became excruciating. Accompanying this pain, shortness of breath was evidenced. Oddly enough, the patient became more concerned with his shortness of breath than with his pain; it became so distressing that he was taken to the Georgia Street Emergency Hospital, and after several hours was transferred to the Golden State Hospital. Inquiry as to the type of gasoline inhaled revealed that it was a cheap grade but did not contain tetraethyl lead.

Examination by the writer within an hour after admission and 10 hours after the accident was as follows: The facies was suggestively ashen. The ear lobes, lips, and finger tips were moderately cyanotic. He assumed a sitting-up position, leaning to the right side; he refused to lie down, claiming his breath would be "cut off" if he did. Respirations were 32 and shallow. The pulse was 90, regular, and a fair volume. Temperature, 100°; blood pressure, 102/66. The pupils reacted to light and accommodation. Teeth were negative. The uvula, soft palate, and posterior pharynx were flaming red and edematous. Inspection of the chest showed the entire excursion to be markedly limited with a pronounced lag of the right chest. Percussion of the left, uninvolved chest was slightly less resonant than normal, while the right chest was duller than normal up to the fifth interspace. Breath sounds on the left were diminished, while on the right they were not audible below the fifth interspace; above that they were barely audible. There were a few scattered rales in the left chest over the area of the second and third interspaces anteriorly. Likewise, there were a few scattered rales on the right side above the fifth interspace. Examination of the abdomen elicited no tenderness; no masses or organs were felt. The patient was not nauseated, nor did he attempt to vomit. The reflexes were all normal. There was no evidence of convulsive seizures, clonic contractions, or any tendencies to drowsiness; in fact, he was alert and apprehensive. The patient had an irritating, hacking cough which he suppressed because of the pain it caused. At this time he expectorated nothing.

The following morning (30 hours after the inhalation) his temperature was 102.4°; respirations 44; pulse 120, regular but thready. Cyanosis had increased. He slept fitfully during the night, with the aid of sedatives, maintaining an upright deviation to the right position. The left respiratory excursion was greater than when first seen, but the lag on the right was most pronounced. The breath sounds of the left chest were increased, as was the resonant note on percussion. A few rales persisted but the right chest showed further diminution of the signs noted the day previously. The chest up to the nipple line was flat on percussion. No breath sounds or spoken voice sounds were heard below the fourth interspace; above this area the sounds were barely audible. He was not nauseated and the nervous system remained unchanged, the patient continuing to be alert and wide awake. At this time a diagnosis of pleural effusion on the right was made. The following morning x-ray pictures confirmed the diagnosis. (Fig. 1.)

Further confirmation was obtained when Dr. Wilmot Pierce, of the Surgical Staff, introduced a needle at the eighth interspace and withdrew 10 cc. of reddish-yellow fluid for diagnostic purposes. (No attempt was made to drain the fluid from the pleural cavity.) On this day, two and one-half days after onset, the temperature rose to 103.2°, and the pulse to 130 and very thready; the respirations remained at 40. At this time the patient complained of no further pain but insisted upon remaining upright. Cyanosis had diminished. The throat remained red and edematous; coughing became frequent and productive, the sputum being dark brown and resembling the prune juice type in pneumonia. On the afternoon of this day, there was a rapid recession of the symptoms and signs. Examination of the chest the following morning and the x-ray pictures (Fig. 2.) were in keeping with the diminishing symptoms.

On the sixth day following onset, his temperature, respiration, and pulse were normal. He insisted upon going home and was discharged from the hospital on the afternoon of May 24, 1937. He was requested, however, to report back to the writer every other day and was examined physically each time. At an interval of every three to seven days, x-ray pictures were taken (Figs. 3, 4, and 5) thus enabling us to have a somewhat graphic picture of this case. May 31, 1937, he returned to work, 13 days after his exposure.

He was normal in every respect at this time, and was finally discharged from further treatment on June 11, 1937.

Laboratory data:

Blood count: Hemoglobin 88%; color index 1.0; erythrocytes 4,450,000; leucocytes 22,800; small lymphocytes 9%; large mononuclears 2%; polynuclear neutrophils 89%.

Urinalysis: Amber and cloudy in appearance; reaction acid; specific gravity 1020; trace of albumin; no sugar. Microscopic examination negative.

Blood Chemistry: Sugar 115.6 mgm. per 100 cc. Non-protein nitrogen 44.15 mgm. per 100 cc.

Sputum: Prune juice color, thick and tenacious. Stained by Ziehl Neelson method—no tubercle bacilli found. Stained by Gram method showed a few scattered pneumococci. Typed with Umfeld serum—neither Type I nor Type II.

Sample of the effusion withdrawn: Reddish-yellow in color and cloudy. Microscopic examination revealed numerous lymphoid and blood cells present.

Inoculations: Inoculation of all known media showed no growth. Inoculation of the guinea pig showed no reaction; the autopsied pig at two months' time revealed no pathology.

THE WRITER has attempted to establish a picture for future comparison with cases of this nature which, undoubtedly, will be reported.

For those readers not acquainted with industrial medicine or workmen's compensation, it should be explained that a case such as the one cited must be established as compensable or non-compensable. To do this the history of exposure must be established. A physician under these conditions can not accept a patient's statements without corroboration. Proof must be obtained, for we are dealing with the insurance company's pocketbook. We must be prepared to meet the opposition of the insurance company lawyers should they doubt the case. In this instance we had substantiating testimony, the word of the employer, and the word of a fellow employee.

Intensive search of the American medical literature fails to reveal a single case similar to the one we are reporting.

In 1930 Battley[2] reported an instance of a boy eight years of age, who sucked a quantity of gas-

Fig. 1
May 20, 1937—Films taken 52 hours after exposure show fluid level in right chest with some clouding of left lung

oline into his lungs and developed certain signs of pneumonia, "wandering" in character. No x-ray pictures were taken. The boy developed marked cyanosis and became unconscious.

In 1934 Nunn and Martin,[3] in the most comprehensive review found by the writer, reported seven cases of gasoline and 65 cases of kerosene poisoning. These cases, all occurring in children,

Fig. 2
May 24, 1937—Films taken four days later show partial recession of fluid level with cloudiness existing above fluid level

were of ingestion of either of the two liquids, but these men felt that in about one-third of the cases, small amounts had also been aspirated. It was in this one-third which showed evidence of lung irritation that the more serious and fatal cases occurred. Rales, rapid shallow respirations, and cyanosis were present. They mentioned the pneumonitis which occurred but made no reference to any pleural effusions. However, effusion following gasoline inhalation was observed by two foreign physicians, and their reports were eagerly sought by the writer, only to prove disappointing because of their brevity.

The Australian physician, St. Leger,[4] in two brief paragraphs, reported a case where effusion occurred after inhalation of "petrol."

Also, H. Schneider,[5] from the *Medizinsche Klinic* in Berlin in 1933, mentioned a case of pleural effusion in a 17 year old boy following inhalation of gasoline. The latter report, although very brief, was similar to the writer's in that the effusion was on the right, pain occurred around the nipple line and was severe, respiratory embarrassment was pronounced, and cyanosis was present. He did not mention any cerebral manifestations. Neither of these last two observers makes any comment regarding the pathology or phenomena of their cases. Probably they were

Fig. 3.
May 27, 1937—Greater recession of fluid level and more normal appearance of right lung field

not interested from the standpoint of industrial medicine.

The effects from exposure to the *fumes* of gasoline are well known. It has been pointed out by all observers that the toxic effect is chiefly upon the central nervous system. This may vary from mild intoxication wherein the exposed is dizzy, staggers as if drunk, gets excited and hilarious; or the more pronounced form in which stupor, coma, and death may occur. Twitching, clonic spasms and convulsions are invariably present in the severely exposed. Alice Hamilton[6] cites numerous instances wherein death occurred although the exposure, apparently, was trivial. Animal experimentation has verified these same observations. Haggard[7] beautifully illustrated the degree

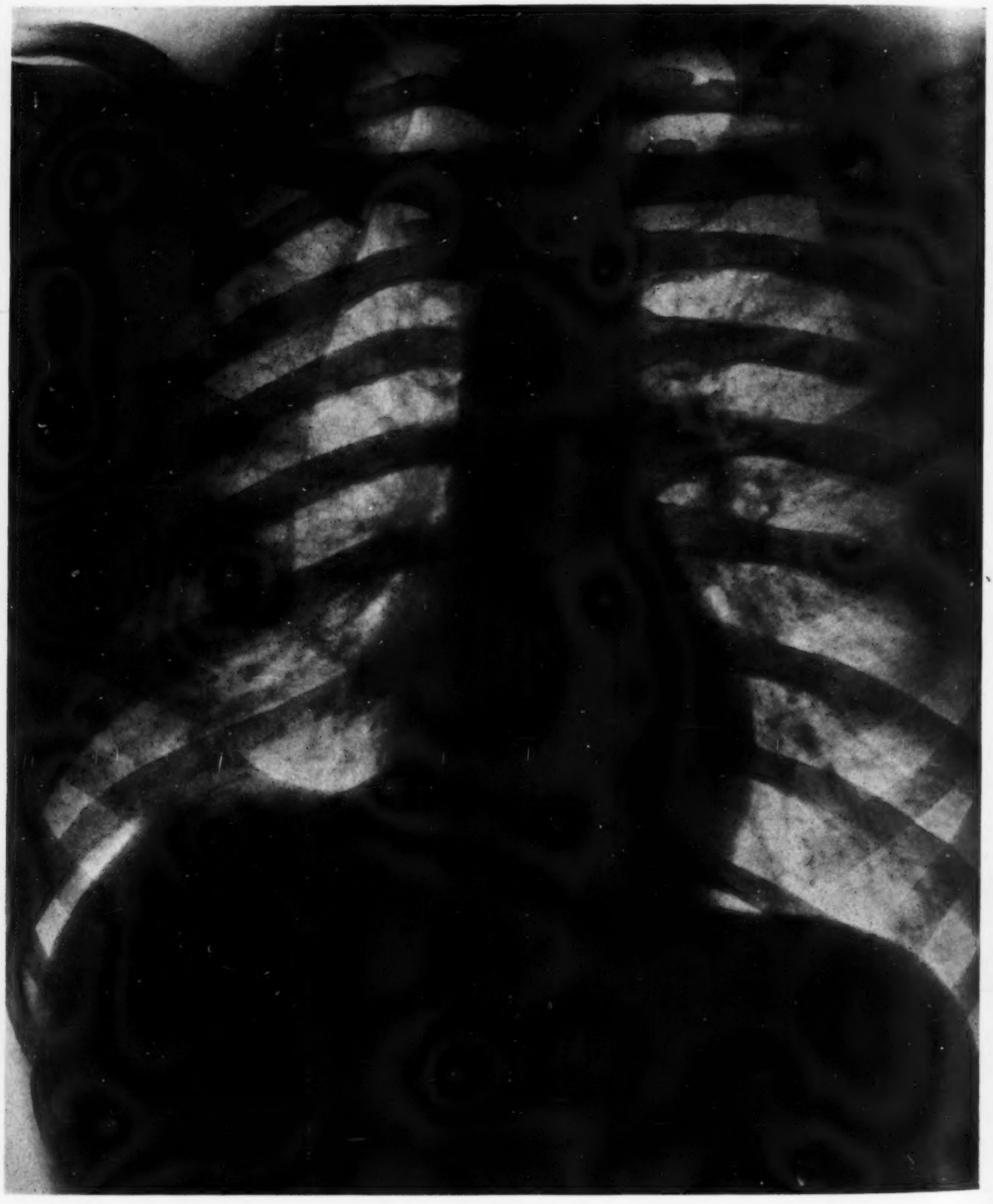


Fig. 4.
June 3, 1937—Disappearance of evidence of fluid.
Evidence of pleurodiaphragmatic adhesion

of intoxication by increasing the saturation of the exposed air. Experimenting with dogs, he noticed they first showed symptoms when 85 parts in 10,000 was reached. At 156 parts, the dog was unable to stand. Taken out, the dog developed clonic spasms but recovered within half an hour except for signs of depression. In three days he was normal. At 162 parts, epileptiform convulsions occurred. At 243 parts, the dog died within two minutes. Thus it is apparent that both in industry where man is exposed and in animal experimentation, the central nervous system is involved and appears paramount. That such reaction is to be expected is further emphasized by the fact that

Fig. 5
June 11, 1937—Lung fields in accord with the normal, well-aerated lungs. Adhesion now reduced to a very small area

Henderson and Haggard,[8] in their book on "Noxious Gases", classify gasoline under the heading of "Volatile Drugs and Anesthetics."

The reader by this time is aware of the contrast we are attempting to make. In our case, in which there was an aspiration of a rather large amount of gasoline (more than ever before recorded), no central nervous system reaction occurred. There was no dizziness, drowsiness, narcosis, coma, or convulsions. How can this be explained? Yandell Henderson,[9] in a personal communication to the author, probably gave a reasonable explanation. He pointed out that "gasoline was not soluble in water or blood to any appreciable extent, and it was only when gasoline entered the lungs as a vapor that any appreciable amount could be absorbed." Yet gasoline is *volatile*. Did none of this liquid entering the lung give off any vapor? Is it probable that this fluid once entering the lung acted as if it were in a closed vessel, cavity, or container and, thereafter, failed to vaporize? If that asumption is true, that is, that it failed to vaporize, and since it is not soluble within the blood, its failure to cause central nervous system reaction can be understood.

But what happened to this liquid? Winternitz,[10] in commenting upon this particular case, admitted that in all his vast experience with gases, he had no experience of effusion following gasoline aspiration. His reasoning was hypothetical but suggested that some necrosis of the lung tissue must have taken place and, following the inflammatory reaction, there was an outpouring of tissue fluid along with some fibrin. This would dilute the gasoline, and all of it, undoubtedly, would emulsify just as lipoids do. This emulsion then would be partly excreted through the sputum and partly metabolized by the body without having been changed to a gaseous state.

Was the effusion, which was considerable in this case, all serous in nature as the result of the pleural irritation, or was some of it gasoline reaching the pleural cavity by transfusion? Undoubtedly, it was all serous.[11,12] No odor of gasoline was detected from the aspirated sample. Unfortunately, we did not run a chemical test on this aspirated fluid for gasoline. The question arises as to why this gasoline did not cause a pneumonia. It is possible that there might have been some pneumonic process present which was masked by the effusion, but this was not observed. Battley, Nunn and Martin showed the pneumonic reaction in the cases they reported but the pleural cavity escaped. Even strong irritants used during the World war did not produce any pleural effusion. Chlorine, phosgene, mustard gas, Lewisite, chlorpicrin, and others were marked irritants to the nasal passages, upper respiratory tract, and to the lung proper; yet from all accounts, the pleural cavity escaped.[13,14] The writer of this article spent seven months with Evacuation Hospital, No. 8, in the front lines of France, and, during the Marne and Aisne-Marne, we handled 1,500 cases of gassed patients. However, during this time there was not a single instance of pleural effusion which he recalls. Winternitz,[15] at Yale, during and after the war did a tremendous amount of work in experimenting with gases. Yet, in reviewing his work, we note no instances of pleural effusion following exposure to these fumes.

In conclusion, the writer does not wish to imply that similar cases to this one have not occurred in the past. The universal use of gasoline and the frequent attempts to siphon it preclude any such assumption. If they have occurred, however, they have not been observed, or the opportunity to study them was not present, or the observer was too careless or indifferent to the importance of reporting them. Alice Hamilton,[16] in urging the publication of this case, wrote that "the profession needs all such cases to build up the complete picture these solvents may produce." Industrial medicine in particular has an opportunity to aid in the completion of our knowledge regarding the various toxic effects of the solvents used every day. Industrial medicine now offers a vast field for research, for statistical study, and for observation of a legion of pathological conditions not prevalent in general medicine. The author and his associates are engaged in an attempt to reproduce the conditions found in this case by animal experimentation.

SUMMARY: A case of inhalation of a rather large amount of gasoline producing an unusual pathologic condition is hereby presented. That none, or at least no perceptible amount, entered the stomach can be assumed by the absence of gastro-intestinal symptoms. Consideration of the sterile effusion, the symptoms present, and the anticipated symptoms which were conspicuously absent, the rapid onset of effusion and the rapid diminution of the effusion lead us into a multiplicity of questions as yet not fully understood nor fully answered. It is suggested that similar cases be reported to aid in the general picture, as yet obscure.

Acknowledgement is made to DRS. ALICE HAMILTON, YANDELL HENDERSON, M. C. WINTERNITZ, W. J. MCCONNELL, HENRY FIELD SMYTH, T. K. KRUSE, and C. C. GUTHRIE for their kindly and favorable comments.

References:

1. ANDERSON, W. D.: Significance of Pleurisy with Effusion, *Diseases of the Chest*, Vol. III, No. 4, p. 20, April, 1937.

2. BATTLEY, J. C. S.: The effect of Liquid Gasoline on Pulmonary Tissue, *J.A.M.A.*, 94:1570, May 17, 1930.

3. NUNN, JOHN A., and MARTIN, FRANK M.: Gasoline and Kerosene Poisoning in Children, *J.A.M.A.*, 103:472, August 18, 1934.

4. ST. LEGER, A. W.: Inhalation of Petrol, *Med. J. Australia*, Vol. I.; p. 300, January, 1922.

5. SCHNEIDER, H.: Acute Benzine Poisoning, *Med. Klin., Berl.*, 29:163, August 25, 1933. (*J.A.M.A.*, 101:1438, October 28, 1933.)

6. HAMILTON, ALICE: Industrial Poisons in the United States, Ch. 28, 401-409.

7. HAGGARD, H. W.: The Anesthetic and Convulsive

Effects of Gasoline Vapor, *J. Pharmacol. & Exper. Therap.*, 1920, 16:401.

8. HENDERSON, YANDELL, and HAGGARD, H. W.: Noxious Gases.

9. HENDERSON, YANDELL: Personal communication to author, November 9, 1937.

10. WINTERNITZ, M. C.: Personal communication to author, November 9, 1937.

11. SMYTH, HENRY FIELD: Letter to author, October, 1937.

12. MCCONNELL, WM. J.: Letter to author, October, 1937.

13. Surgeon-General's report.

14. GIBSON, COL. ADELNO: *Bull. N. Y. Academy of Medicine*, p. 397, July, 1937.

15. WINTERNITZ, M. C.: Pathology of War Gases, New Haven, 1920.

16. HAMILTON, ALICE: Personal communication, October 26, 1937.

Results of Roentgen Therapy

—*In Essential Hypertension*—

F. P. BOSWELL, M.D.,
Montgomery, Alabama

FOR the past year we have been interested in the work done by Dr. James H. Hutton, M.D., F.A.C.P., of Chicago, and others, in the treatment of essential hypertension by roentgen therapy.* Dr. Hutton, in one of his papers, states that some years ago the late Dr. Frank Smith, Chief Surgeon of the Wabash Railroad, suggested that he investigate the endocrine aspects of essential hypertension. The studies, thus initiated, uncovered an astonishing amount of evidence, clinical, experimental, and from the laboratories of pathology, all pointing to the pituitary and adrenals as probably being responsible. The evidence of these investigations was published in an article by Dr. Hutton in the *Illinois Medical Journal*, 1933. Several papers have since been published by Dr. Hutton and others giving the results of irradiation of the pituitary and suprarenals in about 1,000 cases, of which about 75% were benefited.

The treatment of these cases was begun in the belief that essential hypertension is due to some functional abnormality of the pituitary or adrenals, or both, and which could be corrected by very small doses of x-ray. The harmlessness of this procedure had been demonstrated, long before it was used in these cases, by the much larger doses used in the treatment of pituitary tumors without any damage having been reported to the intracranial structures. As a matter of fact, the doses we use here are much smaller than those employed in dermatological conditions.

The 1936 Year Book of Radiology states that "over irritation of the vegetative nervous system of the skin produces skin lesions such as psoriasis, and lichen planus, which respond to irradiation of the dorsal, lumbar and sacral parasympathetic nervous system. Likewise, in the internal disease groups, such conditions as hypertension, neurocirculatory disorders and angina pectoris, which are all due to over irritation of the vegetative nervous system, respond favorably to irradiation.

In essential hypertension, good results have been reported in the irradiation of the adrenal and pituitary regions. This is due to the fact that the x-ray has a regulating effect on the sympathetic nervous system where over-irritation exists.

At the March, 1937, session of the Leningrad Institute of Radiology in Russia attention was centered chiefly on the effects of the x-ray on the nervous system. Of greatest interest were the Institute's observations proving that this effect is due, not to the direct action on the affected organ, but to the influence on the sympathetic nervous system —thus confirming Prof. Niemenov's theory regarding the biologic action of x-rays, and making changes desirable in current methods of treatment. After 13 years of observation he has finally concluded that the return to normal status obtained by irradiating the parasympathetic nervous system was due to the effect on the over-irritated sympathetic or vagus nerve, depending on which of them was affected.

This form of treatment is not intended to include those cases of hypertension due to renal impairment, advanced vascular sclerosis or adenomata of the suprarenals. The well known surgical procedure of splanchnic section with removal of the first and second lumbar ganglia and partial section of the adrenals undoubtedly has relieved some cases of hypertension, but it is recommended that irradiation, being a simpler method with no mortality, be tried first.

Harrison makes the following statement: "Irradiation will help avoid unnecessary operations on the sympathetic nervous system and operative interference should not be attempted until the effects of irradiation have been definitely determined."

So far as can be determined, the phenomena reported to follow splanchnic resection or adrenal denervation are of the same kind and order of magnitude as those following irradiation of the pituitary and adrenal regions.

At the present time, we are using the following dose: 70 r to 76 r; 2 mm. aluminum filter; 50 cm. skin target distance. Each side of the pituitary is treated through a portal 10 x 10 cm., and the adrenal area through a common portal 15 x 15 cm. All three areas are treated on the same day. Frequency of repetition depends on the response of the blood pressure. If, after one or more treatments, relief of symptoms occurs and there is considerable fall in blood pressure no further treatment is given until either the blood pressure begins to rise, or, if it has not yet fallen to a satisfactory level, it becomes evident, after a number of observations at approximately weekly intervals, that no further fall is to be expected. Treatments are repeated at weekly intervals until there is some response or until at least six have been given.

Our experience has been about the same as others, which indicates that more than 75% of the patients can be symptomatically relieved, that is, headache, vertigo, tinnitus, irritability, tenseness, pains in the extremities and precordial distress. About the same number experience a marked fall

* Presented at the Eighteenth Annual Meeting of the Surgical Association of the Atlanta and West Point Rail Road, the Western Railway of Alabama, and the Georgia Railroad, Atlanta, March 24, 1938.

in blood pressure. With most of these the status can be maintained. Apparently, they need further treatments which may be given at intervals of several months. Some patients, after experiencing this satisfactory response, have a return to their original high levels and do not respond to further treatment. There are some patients that are entirely unaffected by this form of therapy. There is neither symptomatic relief nor fall in blood pressure noted after treatments.

The results reported here have largely been obtained by other men with whom I have corresponded and whose reports I have read. Our own series is limited to about 25 cases, ranging in years from 35 years of age to 65 years of age.

CASE HISTORIES are briefly reported, as follows:

MRS. W. . . .; age 65 years; referred by Dr. Stewart; was seen in April, 1937, with a blood pressure of 210/120. She received one x-ray treatment to all areas with rather spectacular results. Within one week her blood pressure had dropped to 165/100 with complete relief of all symptoms and she has not needed further treatment to date.

MRS. P. . . .; age 35 years; referred by Col. Gore. Senior Medical Officer at Maxwell Field; had been running a hypertension of over 200 for four years. Her mother had died of cerebral hemorrhage due to hypertension at the age of 45. This patient was exceedingly apprehensive of a similar fate. Complete physical examination including urinalysis, blood examinations, revealed no physical impairment except the hypertension. She had had no surgical operations. She complained of severe headache, was "awfully dizzy." She had been fitted with several pair of glasses, none of which seemed satisfactory; was able to read but very little. She felt very depressed and life did not seem worth living. When I talked to her a week ago, she stated that all these symptoms had disappeared and that her general outlook on life had entirely changed; especially is she happy because she can read all she cares to without glasses.

She was first seen March 18, 1937. Blood pressure 210/120. She received four x-ray treatments at weekly intervals. The blood pressure readings were taken very third day by Col. Gore and Capt. Powell, of Maxwell Field, also by my associate, Dr. Lozano, and were recorded as follows:

March 18 ..... 210/120
x-ray treatment
March 21 ..... 190/115
March 25 ..... 172/115
x-ray treatment
March 29 ..... 162/100
April 1 ..... 170/100
x-ray treatment
April 8 ..... 168/100
x-ray treatment
April 15 ..... 149/100

She had received no further treatment and her pressure has remained in these lower levels. A reading on October 29, 1937, was 145/80. We are keeping her under observation and should there be any tendency toward elevation, further treatment will be given.

IN THE CASE of Mrs. Z. . . .; referred by Dr. Mount; 50 years of age; hypertension 230 to 250 which had existed for several years; marked headaches, dizziness, etc., with five treatments we were able only to reduce her pressure to 185/100; however, symptomatically she felt much better.

MISS MACM. . . .; age 58; weight 120; headaches, tinnitus, dizzy spells, pain in the chest and legs; had hypertension for years; urine negative.

December 12-37 ..... 260 plus/130
x-ray treatment
December 19-37 ..... 220/120
x-ray treatment
December 27-37 ..... 210/115
x-ray treatment
January 7-38 ..... 200/115

No further treatment given to date. Patient feels fine.

MR. B. . . .; age 40; weight 170; hypertension for several years; highly nervous, excellent physical examination, urine negative.

December 17-37 ..... 162/128
x-ray treatment
December 29-37 ..... 145/90
x-ray treatment
February 21-38 ..... 160/110
x-ray treatment
March 8-38 ..... 138/90
x-ray treatment

Patient feeling fine at the above date, nervousness markedly relieved.

MR. T. . . .; hypertension for years; urine negative; age 45; weight 200; headaches, dizziness, precordial distress, nervous irritability.

January 17-38 ..... 215/140
x-ray treatment
January 23-38 ..... 175/110
x-ray treatment
January 30-38 ..... 180/110
x-ray treatment
February 13-38 ..... 190/110
x-ray treatment
February 20-38 ..... 175/110
x-ray treatment
February 27-38 ..... 170/105
no treatment this date

Patient feels very much better, able to pass annual physical examination for employment.

MR. G. . . .; age 60; hypertension for several years; nervousness, etc.

January 19-38 ..... 190/100
x-ray treatment
January 26-38 ..... 165/90
x-ray treatment
February 2-38 ..... 160/90
x-ray treatment
February 9-38 ..... 160/90
no treatment given
March 15-38 ..... 160/100
no treatment given

Patient feels fine; is able to do detail work much better.

MR. S. . . .; Birmingham, Alabama; age 45; weight 200; hypertension for several years; urine negative.

March 6-38 ..... 208/140
x-ray treatment
March 12-38 ..... 200/135
x-ray treatment
March 19-38 ..... 180/120
x-ray treatment

Feels much better.

X-ray therapy applied to the pituitary and adrenal regions is not offered as a permanent cure for essential hypertension but the method is undoubtedly a valuable addition to our armamentarium in the treatment of these syndromes and others that have, as one factor, a disturbance of the vegetative nervous system and the endocrines most closely related to it. With the number of cases which have been subjected to this type of therapy and shown favorable response, now running to about 1,000, treated by various men, reporting the same results, it seems fairly certain that about three out of four of these patients can expect symptomatic relief and a material drop in blood pressure. By keeping the blood pressure in the lower levels cerebral hemorrhage with its disastrous consequences may be prevented; also the damage to the heart and kidneys which inevitably results from long continued hypertension may be mitigated.

In cases that respond a great deal of relief is afforded the patient, and undoubtedly increases his span of life, and his activities while living.

Bibliography:

HUTTON, JAMES H.: Low Dose Irradiation of the Pituitary and Adrenals for Essential Hypertension, *Am. J. Clin. Med.*, 1936.

LANGER, HEINZ: Roentgen Treatment over Vegetative Nerve Centers or Ganglia in Diseases Presenting Symptoms of Disturbances of the Vegetative Nervous System. *Am. J. Roentgenol.*, 28: 747-763, 1932.

HUTTON, JAMES H.: Treatment of Essential Hypertension and Diabetes with X-Rays, *Clin. Med. & Surg.*, 1935.

The Year Book of Radiology, 1936.

POHLE, ERNST A.: Clinical Roentgen Therapy, 1938.

HARRISON, BEDE W.: Textbook of Radiology, p. 195.

GOLDZIEHER, MAX A.: "The Adrenals," page 254.

O'HARE: Mentioned by HERRICK; Hypertension and Hyperglycemia.

HUTTON, JAMES H.: Personal communications.

Discussion:

DR. L. P. HOLMES, Augusta, Georgia: Zimmern and Cottenot (1912) suggested the irradiation of the adrenal glands on the theory that hypertension was caused by over activity of these glands, and several workers followed this suggestion, reporting satisfactory results by this method; however the early workers appeared to continue their observations over too short a period to be conclusive (usuually much less than a year).

Cases of essential hypertension or hypertension without albuminuria appeared to be benefited more than other forms of the disease.

The French writers prefer medium voltage 130 to 135 K.V. with filter of 5 to 6 mm. of aluminum, treating areas over the adrenals on either side of the spine.

In 1928 Desjardins reviewed the literature and found the evidence unconvincing that the adrenals are easily affected by the roentgen ray.

Zimmern and Blande suggested that the normal thyroid as well as the normal adrenal are quite resistant to irradiation, but in a condition of hyperactivity both may be sensitive. They believe it may be possible that the good clinical results obtained by them were due to the effect on the vegetative nervous system rather than on the adrenals themselves. Others concur in this view.

Hutton, Culpepper and Olson reported in the *Archives of Physical Therapy* in 1936 the treatment of 177 cases of hypertension by irradiation of the pituitary glands and adrenals with symptomatic relief and decrease of blood pressure in 73%.

Baird, Lingley and Palmer, 1934, in *New England Journal of Medicine*, reported treatment of eight cases of essential hypertension by irradiation of the pituitary, the adrenals or both. They report no effect on the blood pressure. They used high voltage radiation with copper filter in larger doses than used by Hutton.

Basophilic pituitarism and hypertension are associated, as Cushing reported a case of a 15 year old girl with systolic pressure of 140 over 105, reduced by the first series of radiation to 115 systolic over 80. This reading was made five months after the treatments had been given over the pituitary gland.

Levy, Dorn and Weinstein in 1921 and others, in making blood pressure observations followed irradiation of various parts of the body, noted frequent variations from the normal, sometimes quite marked.

Groedel, in Germany in 1922, found that a sterilizing dose of x-rays to the ovaries caused a reduction in the hypertension and other symptoms associated with the natural menopause, as long as seven years after the menstruation had stopped.

To quote a comment by Pohle: "Goldblatt produced persistent hypertension in monkeys and dogs by constriction of the renal arteries. This experimental hypertension appears to be due to a humeral mechanism initiated by ischemia of the kidneys in conjunction with which the adrenal cartical hormone apparently plays a part. Aside from Goldblatt's interesting work, a relation between the adrenals and hypertension has not been established, except in the rare cases of adenoma of these glands. The fact of adrenal hyperactivity has not been proved, possibly because of technical difficulties as yet unsurmounted. Opinions differ concerning the effect of roentgen irradiation on the adrenals, the pituitary (except in basophilic adenoma) and the caroted body for hypertension, and sufficiently prolonged periods of observation of favorable cases are lacking.

"The psychic influence of therapeutic procedures in this disease is very important. These facts make it necessary at this time to suspend judgment as to the value of roentgen rays in treating hypertension."

Arthritis

—In Logical Conception—

J. KREVIN LEIR, M.D.,
Jersey City, New Jersey

CHRONIC arthritis is a systemic disease affecting characteristically the structures of one or more of the joints of the body associated with disturbances of various organs, dependent upon the individual case. There are various forms of arthritis. For our present purpose we may classify them into two main groups:

A. Rheumatoid or Atrophic:
   1. Specific Causes:
      (a) Gonorrheal;
      (b) Tuberculosis;
      (c) Syphilitic;
      (d) (Infectious) Typhoid, Dysentery, Scarlet Fever.
   2. Non-Specific Cause.

B. Hypertrophic Type:
   1. Specific Cause:
      (a) Secondary to trauma;
      (b) Associated with disordered metabolism (climacteric, scurvy, hemophilia).
      (c) Associated with organic disease of the nervous system (Charcot's joints, syringomyelia).
   2. Non-Specific Cause.

Atrophic or rheumatoid arthritis is usually found in slender patients between the ages of 20 and 40 years. The body as a whole sags. This outside appearance of failure corresponds to actual failure of the body to do its work as shown by underweight, weakness, muscular atrophy, and low vital capacity and metabolism. Inefficiency of the circulation shows itself in a low blood pressure, secondary anemia and subnormal temperature. It is evident that the organs and viscera responsible for these functions are working under great disadvantage, and hence the body as a whole presents decreased resistance to invading micro-organisms.

In the earlier stages the disease manifests itself as a migratory swelling and stiffness of the joints, in the later stages, more or less by deformity and ankylosis.

Hypertrophic arthritis is more common in individuals 40 years or over, who are inclined to be heavy set and with a tendency to overweight, high blood pressure and good muscular development.

These people, although starting with good body mechanics, soon acquire visceroptosis and poor posture. The arthritic changes are characterized by certain degenerative and hypertrophic changes in the bone and cartilage, are more prone to occur in joints subjected to weight bearing and mechanical stress and strain.

THE disease under consideration is as old as history itself. It is common to both man and animals, and is distributed over the greater portion of the globe, being most common in the temperate zones. Chronic arthritis is generally recognized in all European and North American countries as the most economic and humanitarian problem that chronic disease presents. It is more common than tuberculosis, heart disease or cancer.

Army statistics show that arthritis is 10 times more common than diabetes.

In England, rheumatism causes one-sixth of the total industrial disability.

In Berlin it is said that disability from arthritis is three or four times greater than that from tuberculosis.

In Sweden four hospitals have been built for the exclusive care of chronic arthritis.

According to Garrison, in History of Medicine, the earliest known disease to which prehistoric man was exposed was probably some form of arthritis, at that time unrecognized. The spines of the Heidelbergs (7000 B.C) showed signs of Potts' disease, which was also common in later years and was detected in Egyptian mummies. Human paleopathology dates back to the late Pleistocene age (500,000 Years B.C.). In Neolithic man, the cave-gout of Virchow (arthritis deformans) was common among the various types of humans during the Pleistocene era including the cave-dwellers. This was thought probably due to environmental conditions (damp walls and ground) but the disease surely afflicted men of that time with appalling frequency. Evidence of this disease was also shown in the skeletal remains of the Incas in the highlands of Peru, and in the earlier tribes of the North American Indians.

Symptoms of gout were well described and extensively treated during the Byzantine period.

In 1861, Virchow gave the name of "arthritis deformans" to certain forms of the disease then known as rheumatic gout. Since then, as well as during the preceding centuries, and despite many changes of nomenclature, ideas of classification and opinions as to cause and treatment, arthritis continued to baffle the best efforts of the many students of this disease.

Therefore, when any new or advanced theory of the possible cause and logical treatment of arthritis is proposed, an intense interest is immediately aroused and even more study and investigation are undertaken, for it is well known that partial or complete failure in the battle against this disease has been the sum total of our efforts.

The maxim of Epictetus, given to the world during the first century of the Christian era, has direct application in this connection and is herewith submitted: "What is the first business of one who studies philosophy? To part with self-conceit. For it is impossible for anyone to begin to learn what he thinks he already knows."

A WEALTH of literature is available on practically every phase of this question. Every causative factor and every form of treatment has been intensely studied, discussed and applied, and yet this disease continues to exact its awful toll and remains the most intractable and greatest economic problem facing the whole world.

So now let use reason together and follow the tenets of Harry D. Kitson in his masterly contribution entitled, "How to Reason."

He states as follows:

The reasoning process is one of problem-solving with a definite sequence of steps:

First: To acknowledge and recognize the difficulty.

Second: To call up various methods of solution by drawing inferences from facts put up in the form of judgments.

Third: To decide on the basis of one of the solutions that comes tinged with certainty.

Do not read facts merely as they come in the text; but seek the relations between them. In other words, do not only acquire but also construct.

One reason difficulty is experienced in reasoning about a certain subject is that the reader does not know enough about that subject. In addition to quantity of ideas, good reasoning demands that the ideas conform to certain qualitative standards. They must arise with promptness in an orderly manner; they must be pertinent to the matter in hand, and they must be clear.

Ideas may be clarified by:

1. Definition;
2. Classification.

Reasoning is a work of originality and intelligence.

The analysis of a complete act of thought may be summed up as follows:

1. A felt difficulty;
2. Its location and definition;
3. Suggestion of possible solution;
4. Development, by reason, of the bearings of the suggestion;
5. Further observation and experiment, leading to its acceptance or rejection.

The essence of critical thinking is suspended judgment, and the essence of this suspense is inquiry to determine the nature of the problem before proceeding to attempts at its solution.

IN APPLYING the foregoing principles to the study of cause and treatment of arthritis, sound and logical reasoning was, of necessity a paramount consideration, and every step leading to the ultimate consummation was definitely followed.

Therefore, in order to present the subject adequately, let us refer to papers read before the Section of Practice of Medicine at the Eighty-fifth Annual Session of the American Medical Association at Cleveland on June 14, 1934. The authors of these papers were Dr. Ernest E. Irons, of Chicago, and Dr. Russell L. Cecil, of New York, and the discussion was by Dr. Wm. J. Kerr, of San Francisco, Dr. Loring T. Swaim, of Boston, Dr. Linn J. Boyd, of New York, Dr. W. Paul Holbrook, of Tucson, Arizona, and other well known men.

In these papers are many pertinent developments, such as the following comprehensive statement by Irons: "The treatment of chronic arthritis presents a problem that requires a radical revision of current medical opinion in regard to the nature of the disease, its importance as a major cause of suffering and disability, and the necessity of a wide-angled therapeutic attack. Chronic arthritis can no longer be thought of as a disease of certain joints, but rather as a systemic illness in which there may be disturbances of the circulation, the general metabolism and nutrition and the gastro-intestinal tract. The mortality of chronic arthritis is low, but the suffering and disability are enormous.

Chronic arthritis offers a major challenge to the medical profession and the public."

In the paragraphs on treatment, infections, allergy, vaccines and general management, Dr. Irons says: "Treatment by injections of vaccines, usually of streptococci origin is widely practiced, and undoubted instances of improvement under this treatment have been reported by excellent observers. It must be evident, however, that, in a disease in which several causes are almost always active, dependence on one method alone results in the neglect of other procedures of equal importance to the welfare of the patient, and if vaccines are used in combination with other necessary methods, much caution is needed in evaluating the contribution of vaccines to the improvement."

The paper by Dr. Cecil is likewise interesting. It speaks of the effect of medical and dietetic treatment and then suggests: "An arthritic patient should start in Boston, and make a circuit of the United States and Canada, taking treatment for his disease in various medical centers, as it was prescribed by the local authorities in these communities. In some places, focal infection would be stressed. In other clinics he would receive vaccines. In still others he would be put on a rigid dietary regimen, and finally he might receive physical therapy and orthopedic treatment." Failing of this health-seeking itinerary, Dr. Cecil states: "Having sent a questionnaire, and having received not one but an assortment of opinions, among all those opinions there was only one concurrence. All agreed that salicylates were of value only for their analgesic effect."

In the discussion that followed, the following pronouncements were made: Dr. Linn J. Boyd, of New York: "I have gradually found less and less occasion for the use of vaccines, although at times they yield brilliant results." Dr. S. C. Woldenberg, of New York, says that despite the great value of sulphur therapy it can only be recommended as an adjunct.

From the experiences of some eight or 10 physicians, who also discussed these papers, the conclusion was clearly reached that no adequate treatment for arthritic conditions had been available up to that time and that a radically different approach to this problem is justified.

ARTHRITIS is a constitutional disease and all types may show a bacterial presence, but the source of these bacteria has not been definitely determined in a large percentage of cases, nor is their mode of action thoroughly understood. Any real advance in therapy must be the result of hypothesis and the theory that this bacterial infection may be due to causes within the body rather than an invasion from without, is not impossible nor unreasonable.

A medication conceived to attack along these lines is worth consideration.

Foci of infection have been largely blamed, and undoubtedly an arthritic condition may result from or be aggravated by such a focus. But in many cases, the disease may antedate any demonstrable focus and may actually be the cause of the focus itself rather than the result, for usually the disease remains long after the focus has been removed, and very often no such focus exists or can be detected.

Excess of uric acid in the blood of endogenous formation is believed by many authorities to be a causative factor in arthritis. It has been shown that gout is the result of a disturbance of purine metabolism allowing deposits of sodium biurate in the joints which frequently show "punched out" areas.

Folin claims that the kidney has a specialized uric acid absorbing power, and when not working, allows a high level of circulating uric acid with a greatly lowered excretion.

Most sufferers from chronic arthritis have uricacidemia, and this condition may reasonably be

explained as a result of kidney dysfunction induced by hepatic disturbances with resultant urate deposits in both gout and arthritis.

Endocrine and metabolic imbalance, circulatory disturbances, heredity, nerve strain, trauma, and many other etiological factors have been considered, yet it seems possible that the gastro-intestinal system, generally overlooked as the real causative factor, may be the greatest offender, and that the above mentioned disturbances may be the results of dysfunction of the principal digestive and eliminative organs, and not themselves the primary causes. Putrefactive fermentation, dysfunction of the liver, spleen and gall-bladder and intestinal stasis, will certainly contribute to the formation of toxins and create a favorable field for bacterial action even if these processes do not, in themselves, cause the actual growth of bacteria.

Extensive studies of the liver and spleen prove them the predominating organs for anti-body formation and in conjunction with the reticulo-endothelial system, have the definite function of removing particular antigens from the circulation and establishing cellular immunity.

The widespread distribution of the reticulo-endothelial system, particularly in the liver in the form of Kupffer's stellate cells, in the connective tissue of the vessels and in the lymphatic system, makes a destroyed action in these organs the direct cause of a reduction or absolute loss of anti-body formation, as well as an interference with a normal generation of phagocytic leukocytes. The direct result will inevitably be a pollution of the blood stream and a lowering of its nutritional qualities.

THE idea, therefore, of attacking the disease through the gastro-intestinal tract is not beyond the bounds of reason, and has much in its favor when establishing a standard basic treatment. Any treatment that will improve the intestinal flora by reducing putrefaction, that will stimulate or restore the normal functions of the liver and gall-bladder, and will increase phagocytosis and possibly restore anti-body formation through its action on the reticulo-endothelial system, especially Kupffer's cells, certainly gives greater promise of real benefit to the patient than those aimed at symptomatic relief alone.

We contend that to obtain these normal functions, it is necessary to promote a regular flow of healthy bile and to control excessive intestinal intoxication. This means improved digestion, a regular filling and emptying of the gall-bladder, a proper purification and filtering of the blood stream, and a resultant increase of body resistance and immunity. Normal digestion and bowel elimination, plus a healthy blood stream, usually means a healthy body, and we hold that these two factors are fundamental and worthy of careful attention.

We feel that harsh liver and bowel stimulants such as calomel, phenolphthalein, cathartics, etc., should never be used routinely; mineral oils and their emulsions, and the like, should be used only under strict control. We believe that cinchoninic acid, salicylic acid, and other phenolic compounds are useless and usually harmful in the treatment of arthritis because of their tendencies to interfere with liver and gall-bladder function and a possible deleterious action on the recticulo-endothelial system.

They may give temporary relief through analgesia but, according to literature, their ultimate effect seem to be destructive.

It is obvious that any treatment must have two cardinal characteristics — effectiveness and non-toxicity.

When a drug discloses unfavorable reactions, harmful end-results or poisonous qualities, it must be evident that no permanent benefit can be obtained, and safety is the factor that must be emphatically stressed, and to which earnest attention is directed.

SINCE July, 1934, pharmacological and clinical studies have been conducted at the Jersey City Medical Center, the largest medical institution in the State of New Jersey, with a chemical that was proved not only effective, but also absolutely non-toxic, regardless of the dose, or of the length of administration.

This chemical is the calcium double salt of benzoic and benzyl succinic acids.*

The intent behind the perfecting of this chemical was to achieve the goals mentioned in the preceding remarks. How well this has been accomplished is evidenced by the results that have been obtained.

In the clinical investigation, all types of arthritis were treated, with histories of three months to 25 years of suffering. Nearly all had previously received a variety of treatments that included about every one of the recognized procedures, with little or no permanent benefit. Within a comparatively reasonable time after this chemical was administered, a large percentage showed varying degrees of improvement, in some cases exhibiting a restoration that was most gratifying. Most significant was the absence of reactions. No digestive disturbances or cardiac irregularities were observed, and, after two years, no unfavorable end-results have been reported.

The only adjunct treatments used with the chemical were for local effects, and the favorable results could be from the basic treatment only.

During this period of observation, many suggestions were made and accepted regarding the handling of local symptoms and treating accompanying systemic diseases, and it is only left to summarize the best procedure in handling arthritis as it appears to the writer.

1. Control of intestinal toxemia.
2. Proper diet control.
3. Removal of any focus of infection.
4. Decrease of nerve tension.
5. Increasing peripheral circulation.

---

* Manufactured by the Seydel Chemical Company, Jersey City, N. J.

The theory that arthritis has its inception in the gastro-intestinal tract is not new but, in our opinion, as an etiological factor not sufficient attention has been paid to this particular portion of the human body. We believe that this system is primarily to blame and should be the object of the first frontal attack. Many other bodily ills can be directly traced to a badly functioning alimentary canal; why not arthritis? Instead of merely treating the blood stream, the swollen and stiffened joints, the fever and the pain, it is more logical to get at the probable cause of these by attacking the root of the evil. Therefore, we have in the new chemical a new weapon for this attack, and if used for a time sufficient to rehabilitate the affected parts and in conjunction with intelligent handling of other systemic conditions and local symptoms, the results (in a great majority of cases) will be extremely gratifying. One thing is certain; in following this treatment no possible harm can be done, no habits formed, no dangerous end-results feared, but treatment for this disease, to be properly handled, *must be under direct medical supervision.*

ARTHRITIS is such a tremendously complicated and extensive constitutional derangement that it requires the combined efforts of every branch of medical endeavor if it is to be conquered. The rheumatic diathesis of childhood is the concern of the pediatrician together with diet and posture during his control of the patient; medical problems including systemic diseases are for the internist; particular attention to the digestive system and the alimentary canal would be the contribution of the gastro-enterologist; prevention or correction of deformities offers defiance to the orthopedist and the general surgeon. It is obvious that local symptoms and special needs of the patient must be considered and handled; the concentrated attack by all branches of the medical army will result in outstanding victories.

In our observations, one fact stands out as a challenge to scientific investigators. So far there is no known test whereby the progress of the disease can be determined or the rate of improvement ascertained. If some new test could be evolved to determine the actual progression or retrogression of hepatic function a great step forward would be achieved and a scientific corroboration of the clinical picture would become an accomplished fact. Up to the present time all tests, including x-rays, have served only for diagnostic purposes or to substantiate clinical findings. It is hoped that definite progress may be made on tests of body secretions and excretions to constitute a yardstick of calculations independent of mere subjective symptoms which are generally variable and misleading.

History is replete with instances of doubt as to the logic of a theory or the merit of a new discovery.

But how often have study and application demonstrated the truth of the claims, and ultimate general acceptance followed.

Meeting Calendar

—1938—

MAY:

TEXAS RAILWAY SURGEONS ASSOCIATION, Galveston, Texas, May 9, 1938. *Secretary,* DR. ROSS TRIGG, First National Bank Building, Fort Worth, Texas.

CENTRAL STATES SOCIETY OF INDUSTRIAL MEDICINE AND SURGERY, Nineteenth Annual Meeting, Springfield, Illinois, May 17, 1938. *Secretary-Treasurer,* DR. FRANK P. HAMMOND, 6308 Cottage Grove Avenue, Chicago.

(Program on page 273.)

ASSOCIATION OF SURGEONS OF THE SOUTHERN RAILWAY, Forty-First Annual Meeting, New Orleans, Louisiana, May 24, 25, and 26, 1938. *Secretary-Treasurer,* EDITH A. FOLTZ, Railway Building, Washington, D. C.

JUNE:

AMERICAN ASSOCIATION OF INDUSTRIAL PHYSICIANS AND SURGEONS, Twenty-Third Annual Meeting, in conjunction with the MIDWEST CONFERENCE ON OCCUPATIONAL DISEASES, Palmer House, Chicago, Illinois, June 6, 7, 8, and 9, 1938. *Secretary-Treasurer,* DR. VOLNEY S. CHENEY, Armour and Company, Union Stock Yards, Chicago, Illinois.

(Programs on page 272.)

INSTITUTE OF TRAUMATIC SURGERY, June, 1938. *Secretary-Treasurer,* DR. JOHN D. ELLIS, 122 South Michigan Avenue, Chicago.

SEPTEMBER:

AMERICAN ASSOCIATION OF RAILWAY SURGEONS, Forty-Ninth Annual Meeting, September 19, 20, 21, Palmer House, Chicago. *Secretary,* DR. D. B. MOSS, 547 West Jackson Boulevard, Chicago.

OCTOBER:

ASSOCIATION OF SURGEONS OF THE NEW YORK CENTRAL SYSTEM, Fifteenth Annual Meeting, October 24, 25, and 26, 1938, at New York City. *Secretary-Treasurer,* H. A. FATHAUER, 413 LaSalle Street Station, Chicago.

NOVEMBER:

SECTION ON RAILWAY SURGERY, Southern Medical Association, Oklahoma City, Oklahoma, November 15, 16, 17, and 18, 1938. *Secretary,* DR. JAMES W. DAVIS, Davis Hospital, Statesville, North Carolina.

(Program on page 275.)

NEW YORK STATE SOCIETY OF INDUSTRIAL MEDICINE, Eighteenth Annual Meeting, Albany, N. Y., November, 1938. *Executive Secretary,* FRANK E. REDMOND, 361 Delaware Avenue, Buffalo, N. Y.

DECEMBER:

ASSOCIATION FOR THE ADVANCEMENT OF INDUSTRIAL MEDICINE AND SURGERY, Annual Meeting, New York City, December, 1938. *Executive Secretary,* J. J. BLACKFORD, 370 Lexington Ave., New York.

The Relation of Trauma to Heart Disease

—With Emphasis on the Medicolegal Significance—

ROBERT F. FOSTER, M.D.,
Seattle, Washington

THE term "trauma" may be expanded within its definition to include strain, and it is mainly with strain that this paper is concerned.* This subject has assumed great importance in its medicolegal aspect, because of the forms of insurance, state industrial insurance, separate accident and health insurance, and life insurance policies with the clause of double indemnity for death by injury.

This relation of trauma to diseases of the heart has assumed an importance out of proportion to the relation of trauma to other organs, for many reasons—some with a sociologic twist to them:

First, the general population is aging. Because of this more people with heart disease are working and, therefore, heart disease keeps stepping farther out in front as a cause of disability and death in industry.

Second, latency is a conspicuous feature of heart disease, so that disease pre-existent to injury is very often unrecognized. (We hope never concealed.)

Third, there are those psychological elements—the tendency to ascribe the onset of disease to definite events; the idea of a paternalistic obligation, especially on the part of the government, regardless of the facts involved; and the ease with which traumatic neuroses are formed, especially if conditioned by a reward of compensation—that make the relation of trauma to heart disease of great medicolegal significance.

Types of Trauma that Affect the Heart

THE types of trauma that affect the heart may be classified as follows:

1. Penetrating injuries, such as stab and gunshot wounds.
2. Contusion of the heart, as from a blow.
3. Compression injuries, such as the steering-wheel injury that compresses the heart between the anterior chest wall and the spine, which brings into action the hydrostatic and dynamic forces of the blood in closed cavities leading to rupture or an actual straining of the myocardium and valves.
4. Strain of an unusual effort. This point is open to serious question, as this paper will show.

Effects of Trauma Upon the Heart

THE effects of trauma upon the heart may be classified as follows:

I. Structural changes:
- Puncture wounds;
- Hydrostatic effect with rupture—"a blow-out;"
- Contusion;
- Strain of unusual effort, resulting in acute dilatation. (This is again mentioned in order to refute it.)

II. Disorders of function, resulting in:
1. Sudden death;
   - Cardiac standstill;
   - Ventricular fibrillation;
   - Fatal angina pectoris.
2. Sublethal or delayed lethal effect:
   - Paroxysmal tachycardia;
   - Auricular flutter and fibrillation;
   - Blocks—atrio-ventricular;
     —intra-ventricular;
   - Congestive failure;
   - Angina pectoris.

The types of trauma that give no external evidence and no obvious intrathoracic signs of injury create the greatest problems, such as compression, contusion, and so-called strain, particularly the latter.

The following cases illustrate these problems:

CASE I. E.S. Male. Age 31. Laborer.

COMPLAINT—Weakness; otherwise OK.

HISTORY—Six months ago in construction work lost his footing while lifting a bar weighing 175 lbs. Fell four feet striking on another bar; the full force coming in the left pectoral area. Irregular pulse was noted on initial examination and has persisted ever since.

PAST HISTORY—Negative for rheumatic fever. Devious sources of information revealed an attack of auricular fibrillation precipitated by a car accident, restored to normal in four to five days on quinidine, and for which compensation was obtained.

EXAMINATION—Negative except absolute pulse irregularity. Radial pulse 82. Precordial pulse 124. B.P. 130/80.

PLATE AND FLUOROSCOPIC EXAMINATION—of chest: generalized cardiac broadening gr. 1. Configuration not of the mitral type.

DIAGNOSIS—Post-traumatic auricular fibrillation.

CASE II. L. H. Male. Age 46. Section Hand.

COMPLAINT—Palpitation. Vague precordial pain. Insomnia eight months.

HISTORY—States that eight months ago while lifting a rail he suddenly developed a tearing pain across the chest and fluttering of the heart. He continued working; the pain soon disappeared, but the fluttering continued. He was hospitalized at that time for two weeks, and a diagnosis of auricular fibrillation was made. Although the fibrillation ceased before leaving the hospital he has been unable to work since because of palpitation. Investigation of psychologic background reveals the patient: an orphan; widower one year; father of eight children; living in abject poverty. PAST HISTORY otherwise negative.

EXAMINATION—Negative except pulse 112; after exercise 120; three minutes later 96. Blood pressure 162/100. Marked sinus arrhythmia.

FLUOROSCOPIC—of heart: negative except slight aortic torsion and left ventricular hypertrophy.

ELECTROCARDIOGRAM—two months ago: negative.

DIAGNOSIS—(1) Benign essential hypertension. (2) Irritable heart and effort syndrome. (3) History of paroxysmal auricular fibrillation.

CASE III. A. B. Male. Age 36. Blacksmith.

COMPLAINT—Pain in left pectoral region for 18 days.

HISTORY—States that while bending a heavy bar in making truck trailers he developed precordial pain radiat-

* Read before the King County Medical Society, March 14, 1938.

ing down left arm, which has persisted to a variable degree ever since. PAST HISTORY negative.

HOSPITALIZED 12 days ago. COURSE—12 days ago.

Leukocytes 19,700 per mm. Neutrophils 89%. Daily temperatures up to 100.4° for nine days.

EXAMINATION—Negative. Temperature 98.6°; pulse 78; blood pressure 104/66.

ELECTROCARDIOGRAM—at present: Inverted T waves Leads I and II.

DIAGNOSIS—Coronary thrombosis.

CASE IV. W. H. Male. Age 51. Riveter.

COMPLAINT—None at present.

HISTORY—12 days ago at 2 A.M. (works nights) developed typical anginal attack while using heavy riveting hammer. Pain recurred the following two nights at work; and four days later recurred with persistent pain and he collapsed. M.S. gr. 1/4 i.v., but pain persisted.

HOSPITALIZED—Seven days ago.

COURSE—Daily temperature maximum range 101° to 102.2°. Pain ceased four days ago.

ELECTROCARDIOGRAM—Four days ago: High take-off RT segment Leads I and II . At present—inverted T wave in Lead I.

EXAMINATION—Negative.

DIAGNOSIS—Coronary thrombosis.

One is confronted with the following questions:

Is the alleged injury the primary cause of the symptoms or findings?

Is the alleged injury, if not the primary cause, a factor, contributing towards the aggravation of pre-existing disease?

Legal precedent is of no value in answering these questions because its decisions are based on individual cases, are formed on a deductive type of reasoning, supported by incomplete evidence.

The medical approach consists in the development of an accurate and clear cut diagnosis and in knowledge based upon the results of clinical and necropsy examinations of large series of similar cases.

The Normal Heart and Its Relation to Strain

THE strain of effort has never been shown to have any permanent adverse effect upon the normal human heart, and there is no evidence to show that hard physical work, or strenuous sport, is a cause of myocardial disease. The term "athletic heart" is unjustified, because there has never been any proof of its existence. If there were such an entity it seems that some reliable pathologist would have described such a heart. The promiscuous use of this term has probably been responsible for the introduction of other terms equally inexcusable, such as "industrial heart," "soldier's heart." In the study during 1934 of the effect of chronic exertion on the hearts of jinricksha pullers it was concluded that the hearts of 55% of the subjects studied were not hypertrophied, and 45% were enlarged slightly but in no way could be considered unphysiological.

A study has been made of the participants of the American Marathon race which is run in Boston every spring. This race has afforded an opportunity to study the effect of strenuous prolonged periods of exercise. It was found that immediately after the race practically all the hearts were smaller than they had been just before the race, and examinations made on the day following gave evidence of a gradual return to normal size. This certainly indicates that the strain of effort does not cause acute dilatation of the heart. Annual contenders were studied for many years and showed no evidence of cardiac enlargement. Acute dilatation of the normal human heart has never been observed, except as a consequence of direct trauma such as contusion. The conclusion to be drawn is that the normal heart is no more likely to be injured by strenuous exercise than the normal biceps. This problem falls in the same category as the effect of alcohol and tobacco upon the normal human heart. Although we may have our suspicions, it has never been shown with any degree of conviction that they have an effect one way or another on the normal heart. (This is in distinction to the abnormal heart.)

The possibility of a causal relationship between the strain of effort and the onset of certain benign disorders of rhythm, namely, auricular fibrillation, auricular flutter, and paroxysmal tachycardia, is often alleged. These are usually the cases in which no organic structural disease can be demonstrated, but who date their symptoms back to some unusual effort.

It is many times almost impossible to argue against the primary causal relationship to injury because of the intangibility of the disorder. However, these individuals will usually reveal in their history or examination the stigmata which are designated as neurocirculatory asthenia, effort syndrome, etc., which predispose towards these benign types of arrhythmia. The fundamental cause would seem to be a constitutional nervous disorder. Unfortunately these disorders of rate and rhythm are not so benign and become quite disabling, sometimes resulting in congestive failure, or become responsible for fatal or permanently disabling embolic phenomena. In the absence of a history of attacks antedating the injury, the inability to find evidence of pre-existing organic heart disease, and the close time relationship between the strain and the onset of the cardiac disorder, it becomes many times impossible to segregate these disorders of rhythm as not due to injury.

Coronary Sclerosis

AS A preamble to the discussion of angina pectoris and coronary thrombosis, it is important to review the pathology common to both; namely, coronary sclerosis. In general there seems to be a close relationship between coronary sclerosis and arteriosclerosis in general. The pathology is the same—proliferation of the intima, lipoid infiltration, degeneration, and calcification. The essential feature would seem to be an irreversible deposit of lipoid material which has led many medical writers, having observed the high incidence in diabetes, obesity and other metabolic diseases, to suspect that arteriosclerosis is a metabolic disease of senescence—a defect in the metabolism of fat and cholesterol. Emanuel Libman has compared coronary sclerosis and its complications to gout. In many cases there appears to be a selective localization of arteriosclerosis to the coronary arteries, but the high incidence of premature coronary

sclerosis seems to occur more so in people subjected to less physical strain than the laborer—namely, for example, physicians and executives.

In common with the selective localization to the coronary arteries, other special types of arteries seemed to be involved. These are the small arteries of the retina, muscles, and kidneys; in distinction to the aorta, and the large arteries of the extremities. A practical example in the clinical examinations is this: palpation of the radial arteries is of very little value in judging the probability of coronary sclerosis in comparison to the value of examining the arteries in the eye grounds. All these small arteries have in common a heavy musculature which is very susceptible and responsive to vasomotor stimuli. This would tend to explain the correlation between the high-tension, nervous individual, essential hypertension, and coronary sclerosis. The hereditary predisposition is known to be great, and individuals of stocky stature are especially susceptible.

In summarizing, there is no good evidence to indicate that coronary sclerosis is related to physical strain.

Angina Pectoris and Its Relation to Strain

ANGINA pectoris is a distinct clinical entity due to ischemia of the myocardium, and is characterized clinically by paroxysmal attacks of retrosternal pain, of short duration, referred many times in an irregular and a typical manner but usually down the inner side of the left arm and definitely related to effort, the emotions, and the intake of food.

Although there has been much loose thinking about the origin of the pain of angina pectoris, it is now definitely established that the cause is myocardial ischemia. In turn the two fundamental causes of the ischemia are, in order of their importance, coronary sclerosis and aortic valvular disease of luetic origin encroaching upon the ostia of the coronary arteries. It is primarily a mechanism of claudication in which spasm is a secondary, though conspicuous, feature. A mechanism of spasm alone has never been shown to be sufficient cause for the development of attacks of angina pectoris. Statistical data demand the assumption that angina pectoris is fundamentally on the basis of coronary arterial disease. Although there can be no question that effort is the most common precipitating factor of the attacks of angina pectoris, it is necessary to require that the effort be an unusual one, out of line of ordinary duty, or that additional factors were present, such as unusual cold or emotional shock.

Angina is often alleged to have its *initial* onset in usual efforts. If the history can be elicited, there will be a story of mild indigestion or precordial distress of vague onset. This is the symptom of the occlusion by thrombosis. Not much is thought of these symptoms until work is resumed. Then the pain blossoms out in its terrific intensity. and the victim blames his misery upon the effort of his usual work. The interpretation is that first the thrombosis occurs without dominant symptoms, and impairs the myocardial blood supply so that this impairment, although fairly adequate at rest, becomes manifest on resumption of the usual effort and duties, by a terrific anginal attack.

Coronary Thrombosis

BECAUSE the two conditions have the same fundamental pathology in common the distinction between angina pectoris and coronary thrombosis has not been fully appreciated. Coronary thrombosis has been considered to be simply an exaggerated form of angina pectoris, and there is no doubt but that a large percentage of cases of angina pectoris *do* terminate in coronary thrombosis. Nevertheless, in the manner of onset of the two conditions there is a marked difference that should be emphasized in a discussion from the medicolegal standpoint. This difference is that the typical anginal attack is brought on by effort and the typical attack of thrombosis seems more likely to occur at rest. It would seem that the thrombosis is a complication of coronary sclerosis which is common to both conditions rather than a sequel to the angina pectoris.

It is logical to suspect that the actual thrombosis would occur when the blood pressure is the lowest. This suspicion would seem to be confirmed if thrombosis of the coronary artery occurs with greater frequency at rest and during the sleeping hours, particularly in the early hours of the morning.

Several statistical articles attempting to analyse the contributory factors of coronary thrombosis have been published during the past two years that seem to establish fact where only impression existed before. PHIPPS reported from a study of 437 cases of coronary thrombosis that 60% of the attacks occurred at rest. PARKINSON and BEDFORD, in their series, noted that 40% began at night in bed or asleep; 32% more were not related to exertion; and 27% occurred with exertion, but not unusual exertion.

I would like to present the results of an exhaustive inquiry into the factors and events associated with the onset of coronary thrombosis, made by MASTERS and his co-workers. The material studied was 817 attacks of coronary thrombosis occurring in 555 patients—185 private and 370 ward patients. (See Table I).

TABLE I
CORONARY THROMBOSIS; EVENTS WITH ONSET.*

1.	Rest (lying down or sitting up)	115	(21.7%)
2.	Sleep	104	(19.6%)
3.	Walking	95	(18.0%)
4.	Ordinary mild activity	72	(13.6%)
5.	Moderate activity (except walking)	28	(5.3%)
6.	Unusual or severe exertion	11	(2.1%)
7.	Trauma	1	(0.2%)
8.	During or after meal	28	(5.3%)
9.	Excitement—mental or emotional	27	(5.1%)
10.	Postoperative	22	(4.1%)
11.	Infection	10	(1.9%)
12.	Gradual onset with increasing angina on exertion	9	(1.7%)
13.	No definite onset; no history of pain or other acute symptoms (silent coronaries)	8	(1.5%)

* MASTERS et al. *J.A.M.A.*, 109:546, August 21, 1937.

The exact hour of onset was reported in only 183 instances, but in this small group 50% of the occlusions occurred between 10 P.M. and 6 A.M.

They conclude that:

Exertion, even severe, did not seem to be of significance in the precipitation of an attack. This holds good for walking, straining at stool, coitus, and playing golf.

No other factors—excluding those diseases noted for their association with coronary sclerosis, namely hypertension and diabetes—were of any significance.

I have reviewed the records at the King County Hospital from 1935 to February 1, 1938, inclusive, with the diagnosis of coronary thrombosis. This is not to be taken as a representative cross section of the sick population.

One hundred and forty-three cases were so diagnosed.

Fifty-seven cases only were used for the report. The critera for the selection of cases consisted in any, or a combination, of the three following:

1. Typical clear-cut history and course.
2. Electrocardiogram.
3. Autopsy.

The reasons for exclusion of cases were:

(1) Deaths immediately on admission;

(2) Senile patients becoming weaker and dying;

(3) Sudden pains or postoperative deaths in which pulmonary embolism or some other cause of death was not excluded;

(4) Deaths of decompensated patients unless verified by the above criteria. (See Table II.)

Of course, it is realized that this group does not represent a cross section of the population affected

TABLE II

Occupation		Sex		Age	
Laborer	—17	Male—49		Youngest	32
Skilled laborer	—12				
Housewife	— 7	Female—9		40-45	—3
Office worker	— 3			45-50	—5
Cook	— 3			50-55	—6
Farmer	— 3			55-60	—8
Caretaker	— 2			60-65	—13
Maid	— 2			65-70	—9
Salesman	— 1			70-75	—5
Retired	— 1			75-80	—8
Fireman	— 1			80-85	—1
Contractor	— 1				
Storekeeper	— 1			Oldest	85

1. Progressive angina pectoris	15	31.9%
2. Sudden onset in bed	11	23.4%
3. Progessive decompensation	10	21.2%
4. Resting	7	14.8%
5. Gradual insidious onset	6	12.6%
6. Walking	5	10.6%
7. Heavy work	2	4.2%
7[1]. Straining at stool	2	4.2%
7[2]. Convalescent from influenza	2	4.2%
7[3]. Recurrent thrombosis	2	4.2%
8. Shock from auto accident	1	2.1%
Time of day of onset	(Incomplete Record)	
Early morning	8	17.0%
Afternoon and Evening	5	10.6%

143 Consecutive cases diagnosed coronary thrombosis in the period 1935 to February 1, 1938, inclusive, taken from the files of King County Hospital.

58 Cases of verified coronary thrombosis. Data available as to the onset tabulated in 48 cases.

by coronary thrombosis; nevertheless, these observations tend to substantiate those made by MASTERS, et. al., and these repeated observations certainly give the impression that coronary thrombosis is fundamentally a medical disease and in its onset bears only a casual relationship to trauma and strain.

Conclusions

ALTHOUGH protected by a bony cage, the heart is susceptible to unsuspected injury by reason of its position of vulnerability to compression between the anterior bony chest wall and the vertebral column.

2. The strain of unusual effort has not been shown to produce acute dilation, and has not been shown to produce immediate or late damage to the normal heart.

3. Coronary sclerosis is a disease related to arteriosclerosis in general and is the primary cause of angina pectoris and coronary thrombosis.

4. Coronary thrombosis bears only a casual relationship to the strain of effort.

Bibliography:

1. BRAHDY and KAHN: "Trauma and Disease," Lee & Febiger, 1937. Chap. II, by WHITE, PAUL D. and GLENDY, EARLE R.
2. GORDON: *Am. J. Roentgenol.*, 14:424, November, 1925.
3. GORDON, et al.: *Arch Int. Med.*, 33:425, April, 1924.
4. LEVINE: *Clin. Heart Disease*, 1936.
5. LUTEN: *Am. Heart J.*, 7:36. Quotation from PARKINSON and BEDFORD.
6. LIBMAN: *Bull. N. Y. Academy of Med.*, 11:427, July, 1935.
7. LEVINE and BROWN: *Med.*, 8:245 September, 1929.
8. MASTER, DACK, and JAFFE: *J.A.M.A.*, 109:546, August, 1937.
9. PHIPPS: *J.A.M.A.*, 106:761, March, 1936.
10. SMITH: *Proc. Staff Meet. Mayo Clinic.*
11. TUNG, et al.: *Am. Heart J.*, 10:79, October, 1934.

Past Presidents

THE list of Past Presidents of the American Association of Industrial Physicians and Surgeons includes:

DR. J. W. SCHERESCHEWSKY, U. S. Public Health.
DR. HARRY E. MOCK, Sears, Roebuck & Co.
DR. OTTO P. GEIER, Cincinnati Milling Machine.
DR. C. E. FORD, General Chemical Co.
DR. LOYAL A. SHOUDY, Bethlehem Steel Co.
DR. WM. B. FISK, International Harvester Co.
DR. WM. A. SAWYER, Eastman Kodak Co.
DR. T. R. CROWDER, Pullman Co.
DR. GUY L. KEIFER, Harper Hospital, Detroit.
DR. C. F. N. SCHRAM, Fairbanks, Morse & Co.
DR. C. H. WATSON, American Tel. & Tel.
DR. DON B. LOWE, B. F. Goodrich Tire & Rubber.
DR. E. C. HOLMBLAD, Railway Express Agency.
DR. FLOYD E. SHAFFER, Bethlehem Steel Co.
DR. R. P. KNAPP, Cheney Bros.
DR. ROYD R. SAYERS, U. S. Public Health Service.

The list sets forth the industrial identification coincident with the term of office. DR. MOCK has been a Consultant for many years; and DR. SCHRAM's present identification is as Medical Director of Tennessee Eastman Corporation.

Acute Lead Poisoning: Industrial

—I. History and Physical Findings in a Group of 50 Patients—

IRVING GRAY, M.D., F.A.C.P.,
and
IRVING GREENFIELD, M.D.,
Brooklyn, New York

THE diagnosis of acute lead poisoning is most frequently made, in individuals exposed to the absorption of lead, following the sudden onset of symptoms referable to the gastro-intestinal tract. Since Tanqueral de Planches described his experiences more than a century ago, an enormous literature on the subject has been accumulated. Much of the early knowledge regarding the symptomatology of industrial lead poisoning came from the clinics of European investigators. Within the past quarter-century, however, many important contributions have been made here in America.

Recently we had the opportunity of studying 50 patients with acute (industrial) lead poisoning. We shall describe the symptoms and the essential findings on physical examination. All of the patients were male, white adults ranging from 26 to 50 years of age.

Exposure

LEAD may gain entrance to the body through the lungs, gastro-intestinal tract and skin. Legge and Goadby,[1] Meillere,[2] Oliver,[3] Hamilton[4] and Mayers,[5] agree that the skin intact is practically impermeable to the inorganic compounds of lead. It is doubtful,[6] whether absorption of lead through the skin takes place except when the skin is damaged by inflammation or wound.

Among the organic compounds of lead tetraethyl lead possesses important properties.[7] It is soluble in acetone and alcohol and miscible with fats and oils. The miscibility with fats and oils makes the skin an important avenue of absorption in individuals exposed to tetraethyl lead. The respiratory tract is the most important portal of entry for lead. Lanza[8] has shown that the dusty trades are the most dangerous. Bloomfield and Isbel,[9] as a result of investigations carried on in several industries, established the fact that lead dust in a concentration of 0.10 mgm. of lead per 10 c.cm. of air constitutes a lead hazard. Teleky[10] observed that absorption of 1 mgm. of lead daily for a month is a sufficient amount to be responsible for acute symptoms within that time. It is apparent then that the upper respiratory tract and lungs constitute the most important portal of entry through which dust and fumes may gain entrance to the circulation. Forty-one (82%) of our patients absorbed lead fumes and lead dust by way of the upper respiratory tract. Insoluble lead compounds can be dissolved to some extent by the gastric juices, as demonstrated by Carlson and Woelfel.[11] In view of such studies one must also consider the gastro-intestinal tract as a source from which lead may gain entrance to the circulation. Most authors agree that lead poisoning in the painting industry is due to absorption of lead by way of the gastro-intestinal tract. Nine (18%) of the group absorbed lead from the gastro-intestinal tract. The time that elapsed between the initial exposure and the onset of symptoms ranged from two weeks to three months in those exposed to the inhalation of lead fumes and lead dust. The period of exposure in the group in whom absorption occurred through the gastro-intestinal tract, ranged from two to five years.

CHART I
OCCUPATIONAL DISTRIBUTION

Industry	No. of Workmen
Riveting	35
Painting	9
Water tank cleaning	4
Lead smelting	2

During 1935, a group of men were employed in the construction of a bridge. The steel girders used in the project were painted with red lead. While driving the rivets through the girders the red lead was melted and the fumes escaped. In the construction of the tower a situation was created which was comparable to an enclosed chamber. These men wore no masks while at work, and the majority of those affected developed acute toxic symptoms after a short period of exposure. The group of men employed in this project had worked in the steel construction industry from five to 30 years. In their previous years of employment as riveters they were never exposed to the absorption of lead in an enclosed chamber. This was an unusual situation, for this group of workers, and gave rise to acute toxic symptoms within a few weeks. The water-tank cleaners used rapidly revolving steel brushes to scrape

CHART II
SYMPTOMS IN ORDER OF FREQUENCY

Epigastric pain	37
Constipation	35
Colic	30
Weakness	25
Loss of weight (average loss, 18 pounds)	20
Arthralgia	19
Elbows	
Knees	
Shoulder joints	
Wrists	
Wrists	
Ankles	
Loss of appetite	17
Myalgia	14
Arms	
Legs	
"Bad taste" in mouth	12
Vomiting	11
Numbness—extremities	10
Sleeplessness	8
Nausea	7
Headache	7
Nervousness	6
Backache	6
Impotence	1

In order to avoid unnecessary repetition the symptoms enumerated above were classified according to systems.

the rust from the inside of a water storage tank. There was a very high concentration of lead dust within the tank. In spite of such precautions as masks, four of a group of 20 workers developed acute toxic lead symptoms.

Gastro-Intestinal Tract

IT IS apparent that symptoms referable to the gastro-intestinal tract were predominant. Acute abdominal colic still remains the most striking feature in acute lead poisoning. The order of frequency in which the symptoms occurred is as follows: epigastric pain, constipation, colic, loss of appetite, vomiting and nausea. Siccardi and Dozzi[12] have demonstrated experimentally that spasmodic contraction of the smooth muscle fibers consisted of two separate phases: (1) Inhibitions of spontaneous contractions; and (2) Increased tonus. Constipation varied from infrequent bowel movement to obstipation. In one patient despite the use of daily saline purgatives, obstipation persisted for 11 days.

Twenty-five (50%) of the patients continued to work after the onset of symptoms until they were compelled to stop because of severe colic. The pain was intermittent in character and located along the course of the colon, especially in the region of the descending colon and sigmoid. It was severe in character and was often associated with a slowing of the pulse rate. Relief was obtained by firm pressure over the lower abdomen. On occasion, they were seen to hold their hands firmly over the abdomen while in the reclining position. If colic occurred in the upright position they would bend over some firm object for the purpose of producing pressure over the abdomen. Jones[13] noted colic as a predominant symptom in 90% of battery workers. Decreased appetite, vomiting and nausea were undoubtedly responsible for loss of weight. In this group of 50 patients, the average loss of weight was 18 pounds. The exact mechanism involved in the production of muscular pain and fatigue is much disputed. Harnack[14] attributed weakness to the action of lead on striated muscles. On the other hand Hitzig[16] contended that the lead acted as a local irritant to smooth muscle fibers. Twenty-five (50%) complained of severe weakness, which incapacitated them. Kessler[15] and Haureck[17] described a sweetish metallic taste among lead workers. This complaint was registered by 12 (24%) of the group.

Neuromuscular System

ARTHRALGIA, myalgia, numbness, sleeplessness, headaches and nervousness were grouped under this heading. Nineteen (38%) complained of pain in the larger joints of the body. Wright [18] and Linenthal[19] called attention to the "rheumatic" pains which occur among lead workers. Occasionally these pains closely resembled lumbago. Myalgia due to lead may frequently be incorrectly diagnosed and in the absence of a complete occupational history, therapeutic measures may be exhausted without relief. Two patients (4%) compained of severe pain in the back which would have been interpreted as lumbago, of undetermined origin, had a history of industrial lead exposure not been obtained. Davis[20] recorded arthralgia, due to lead, in a professional golfer which went unrecognized until a history of exposure was obtained. Arthralgia was noted in 19 (38%) of the patients. In this study the joints involved had none of the characteristics of inflammatory joints. They were not swollen, disfigured or discolored in any way. Motility of the joint was normal. The pain was placed "in the joint" and was fleeting in character. No tenderness was present.

Pain in the muscles as complained of by 14 (28%) of the patients was noted. Thompson[21] noted the occurrence of pains in the arms and legs in 36% of 64 patients who came under his observation. The pain did not follow the course of any particular nerve. Firm pressure in grasping a large muscle body caused pain. There was no cutaneous hyperasthesia or parasthesia over similar cutaneous areas.

Numbness was present in 10 (20%) of this group. Upon close interrogation, it was learned that the numbness could be localized over specific areas of the skin and on one occasion was placed over the small finger and the ring finger, an area which corresponded to ulnar nerve innervation. All of the patients were right-handed individuals, yet the numbness was equally divided between the right and left hands.

Sleeplessness was noted in eight (16%) of the patients. In each instance the pain in the abdomen and joints was greater at night than during the day. These individuals were "tired" and had the desire to sleep but could not because of pain.

Headache was noted in seven (14%) of the group. It was not localized and was of short duration. In one instance it was marked and lasted long enough to be considered an indication for a spinal puncture. The spinal fluid was not under increased manometric pressure. There was no increase in the number of cells, and chemical examination of the fluid withdrawn for study revealed normal albumin, globulin and sugar. Serologic study of the fluid was negative for syphilis.

Nervousness was noted in six (12%) of the patients. One patient volunteered the fact that he had become impotent following the onset of his acute toxic symptoms.

CHART III

PHYSICAL EXAMINATION (PERTINENT FINDINGS)

Pallor	36
Lead line	10
Oral hygiene	
Poor	35
Good	8
Fair	7
Epigastric tenderness	16
Cecal tenderness	6
Sigmoid spasm	25
Joint function	Normal
Grip (dynamometer)	Normal
Right (average)	85
Left (average)	75
Loss of weight (average)	18 lbs.

Physical Examination

IN A review of the literature, the paucity of positive findings on physical examination, in patients with known acute industrial lead poisoning, is striking. The most prominent finding in our group was pallor, which was noted in 36 (72%). There is no characteristic appearance to the facial pallor of a patient with acute lead poisoning which will differentiate it from the pallor which accompanies any other severe illness or anemia. The facial pallor resembled that seen in patients in shock or with chronic secondary post-hemorrhagic anemia.

Oral hygiene is an important factor in the production of a lead line. It is often more pronounced in those patients whose oral hygiene is poor and who have neglected infections about the gingival margin. When the oral hygiene is good a lead line is seldom seen even when the diagnosis of acute lead poisoning is established. The Burtonian line itself is caused by the conversion of lead into lead sulphide by the hydrogen sulphide generated in the mouth due to decaying vegetable matter. Microscopic examination of small sections of the gum edge shows that a lead line consists of fine black amorphous granules which lie in the connective tissue at the base of the epithelium. The lead line indicates absorption of the metal rather than intoxication. Much stress has been placed on the presence of a blue line on the gums. It should be remembered that a blue line on the gums may be noted in blood dyscrasias as well as in other metallic intoxications. In a group of workers exposed to lead absorption, the presence of a lead line in a few may be used as an index of lead absorption in the group. As stated previously, if the oral hygiene is good lead may be absorbed without being deposited in the gum margin. Jones[13] noted that the presence of the Burtonian line might be due to the absorption of lead at a slow rate and did not necessarily indicate disability. In spite of the poor oral hygiene in 35 (70%) of the patients, a lead line was noted in only 10 (20%).

In discussing the symptoms of acute lead poisoning, it was noted that the majority of patients complained of pain referable to the gastro-intestinal tract. In the examination an attempt was made to correlate subjective symptoms with the physical findings. It was noted that 47 (94%) patients had positive findings on abdominal examination. Epigastric tenderness was noted in 16 (32%), tenderness on palpation over the cecum was noted in six (12%) and sigmoid spasm in 25 (50%). A small number developed sigmoid spasm during the course of the examination. Firm pressure over the sigmoid, directed toward the midline of the abdomen, afforded almost complete relief from pain. This observation was called to our attention by Dr. C. T. Graham-Rogers,[23] who has had a large experience in lead poisoning.

Those patients with complaints referable to the large joints as noted in the clinical report of our study, showed normal joint function. There were no disturbances in flexion, extension, pronation or supination. In a study of men employed in the printing industry Palmer and Ellis[24] concluded that lead workers had a grip which was below normal, as indicated by the dynamometer. In our group, we noted that the grip of the left hand was less than that of the right; the left averaging 75 and the right 85. All of our patients were right handed.

Summary

LEAD absorbed through the respiratory tract is the most common cause of acute lead poisoning. The predominant symptoms are referable to the gastro-intestinal tract. Acute lead colic is the most striking feature in the history. Myalgia and arthralgia are frequent. On physical examination, pallor is a prominent finding. Attention is called to the paucity of objective findings including the absence of the lead line on the gum. A detailed history of occupational exposure and the clinical interpretation of the presenting symptoms is essential in the diagnosis.

Bibliography:

1. LEGGE, T. M., and GOADBY, K. W.: Lead Poisoning and Lead Absorption. London, 1912.

2. MEILLERE, G.: *Le Saturnisme*, Paris, 1903.

3. OLIVER, T.: Lead Poisoning, London, 1914.

4. HAMILTON, A.: Lead Poisoning in Potteries, Tile Works and Porcelain Enameled Sanitary Ware Factories. *Bull. U. S. Bur. Labor*, No. 104, *Indust. Accident.*

5. MAYERS, M. R.: Lead Absorption. *Indust. Hyg. Bull.* N. Y. State Labor Department, 5:6, December, 1928.

6. Survey of Industrial Health Hazards and Occupational Diseases in Ohio. *Ohio State Bull. of Health*, 1915, p. 378.

7. MACHLE, W. F.: Tetraethyl Lead Intoxication and Poisoning by Related Compounds of Lead. *J.A.M.A.*, 104: 200, January 19, 1935.

8. LANZA, A. J.: Epidemiology of Lead Poisoning. *J.A.M.A.*, 104:2:85, January 12, 1935.

9. BLOOMFIELD, J. J., and ISBEL, H. S.: *J. Indust. Hyg.*, 15:144, May, 1935.

10. TELEKY, L.: *Arch. f. Gererbepath. u. Gewerbehyg.*, 5:132-137, 1933.

11. CARLSON, A. J., and WOELFEL, A.: The Solubility of Lead Salts in Human Gastric-Juices. *J.A.M.A.*, 6:183, 1913.

12. SICCARDI, P. D., and DOZZI, L.: *Clin. Med.*, Italy, 53:1, 1914.

13. JONES, R. R.: Industrial Plumbism, *J.A.M.A.*, 104: 3:195, January 19, 1935.

14. HARNACK, E.: Ueber die Wirkung des Bleis auf den thierishen organismus. *Arch. f. exper. Path. u. Pharmakol.*, 9:152, 1878.

15. KESSLER, H. H.: Accidental Injuries. Philadelphia, 1931.

16. HITZIG, E.: Studien uber Bleivergiftung, Berlin, 1868.

17. HAURECK, P.: *Weyl's Handbuch der arbeiterkrankheiten, Jena*, 1918, p. 43.

18. WRIGHT, W.: Quoted by Alice Hamilton, Industrial Poisons in the United States, 1930, p. 204.

19. LINENTHAL, H.: Early Diagnosis fo Lead Poisoning, Industrial Health, Kober and Hayhurst, Philadelphia, 1924, p. 433.

20. DAVIS, C. M.: *J. Indust. Hyg.*, 5:253, 1923-4.

21. THOMPSON, W. G.: The Occupational Diseases, New York, 1914, p. 260.

22. BURTON, H.: Effect remarquable produit sur les gencives par l'usage prolongé de l'oxide de plomb.

23. GRAHAM-ROGERS, C. T.: Personal Communication.

24. PALMER, W. E.: *J. Bull. 209, U. S. Bur. of Labor Statistics*, 1917.

Cancer

—A New Treatment: Holding Much Promise—

J. R. GARNER, M.D.,
Chief Surgeon: Atlantic and West Point Rail Road Company, The Western Railway of Alabama, and Georgia Railroad.
Professor of Forensic Medicine, University of Georgia School of Medicine

PURSUANT to a recent Act of Congress, April has been designated as "Cancer Control Month" by the President. All of the states, the medical profession, the press, and the radio were invited to participate in a national program for the control of cancer by education of the people and the dissemination of an understanding as to the seriousness of the malady and the impartance of early recognition and treatment.

No more important program could have been inaugurated having for its view the upbuilding of our national health and the lowering of our death rate. Mortality tables place cancer as the second largest cause of death, surpassed only by heart disease.

There are hundreds of thousands of persons in the United States suffering from cancer, and it is said that out of every seven men living today who are 20 years old or older, at least one will die from cancer. The ratio for women is placed at even a higher level—being one out of every five.

As the populace becomes more and more cancer conscious and is made to realize that cancer, in the beginning, is a local condition that may be cured by prompt and adequate treatment, we shall undoubtedly find this malady taking a much lower rating in our mortality tables.

The most specific and conclusive definition of cancer is that supplied by Joseph McFarland, M.D., of the University of Pennsylvania, who says: "Cancer is a malignant new growth that results from the destructive invasion of other tissues by actively vegetating epithelium." Some question has arisen as to whether the fundamental abnormality of cancer should be attributed to the abnormal vegetative activity of the invading cells or to an abnormal inability upon the part of the surrounding tissues to resist the process of invasion. McFarland states that it is the abnormal vegetative activity of the cells, and says: "For unless the cells multiply abnormally, how could they invade." As visible evidence in support of his conclusions, he further cites the development of their mitotic figures and the invasion of the tissues by their increasing masses.

From the earliest time cancer has been a scourge to humanity. No nationality, rank, or caste, can claim exemption. It attacks the high and the low, the rich and the poor, without discrimination and with the same dire results.

In their incipiency many cancers are mistaken for some form of indolent lesion and are thus overlooked. For this reason the laity should be encouraged to look with suspicion upon any lesion that fails to yield to ordinary lines of treatment within a reasonable period of time. The physician should never hesitate to have a biopsy made in any suspicious case, for this alone will determine the innocence or malignancy of the lesion while it is strictly a local proposition and amenable to treatment and cure. We should ever bear in mind that in the development of cancer there is a stage beyond which there can be no hope of effecting a cure, and that all cancers—unless themselves destroyed—will ultimately destroy life.

Again quoting Dr. McFarland—with reference to the treatment of cancer, he says: "The greatest difficulty in effecting a cure lies in the ill-defined localization of the tumor whose numerous fringes penetrate into the surrounding tissues."

Then, since cancer consists of actively increasing cells which invade the surrounding tissues, there can only be two general principles of treatment available: either the new growth must be completely removed, or it must be thoroughly destroyed (killed). This has been the prevailing idea from the earliest history of medicine, and our more recent knowledge appears to offer nothing to the contrary.

There are many early records of attempts at surgical extirpation of cancer but due to the undetectable penetration of the fringes, above referred to, it is impossible to judge with any degree of accuracy the extent or depth of the area to be excised. Recurrences have been all too frequent.

Destruction of cancer by heat has had its day. At first heated irons were used, and later the more refined cautery was substituted therefor. The intent was to kill the malignant tumor but this has proved unsuccessful excepting where the destructive process has been carried to a sufficient extent and depth into the normal tissues to assure that no vestige of malignancy remains.

Treatment by caustics and escharotics has been in use for a long period of time; and in an old medical work, published more than a century ago, is found a prescription for treating cancer which consists of: "Ten grains of corrosive sublimate dissolved in one gill of whiskey, this to be applied once a day until the cancer is destroyed." Fell's cancer salve, of which zinc chloride was the active principle, appeared nearly a century ago, and soon was followed by a formula containing arsenious acid as its active principle, which was introduced by Dr. Marsden, of the London Cancer Hospital. From then on innumerable cancer pastes have been used, all depending upon either zinc chloride or arsenious acid for their action. The inability to control these escharotics, the fact that they exert a destructive action upon normal as well as malignant tissues, and the readiness with which the medical quack grasped these products and ignor-

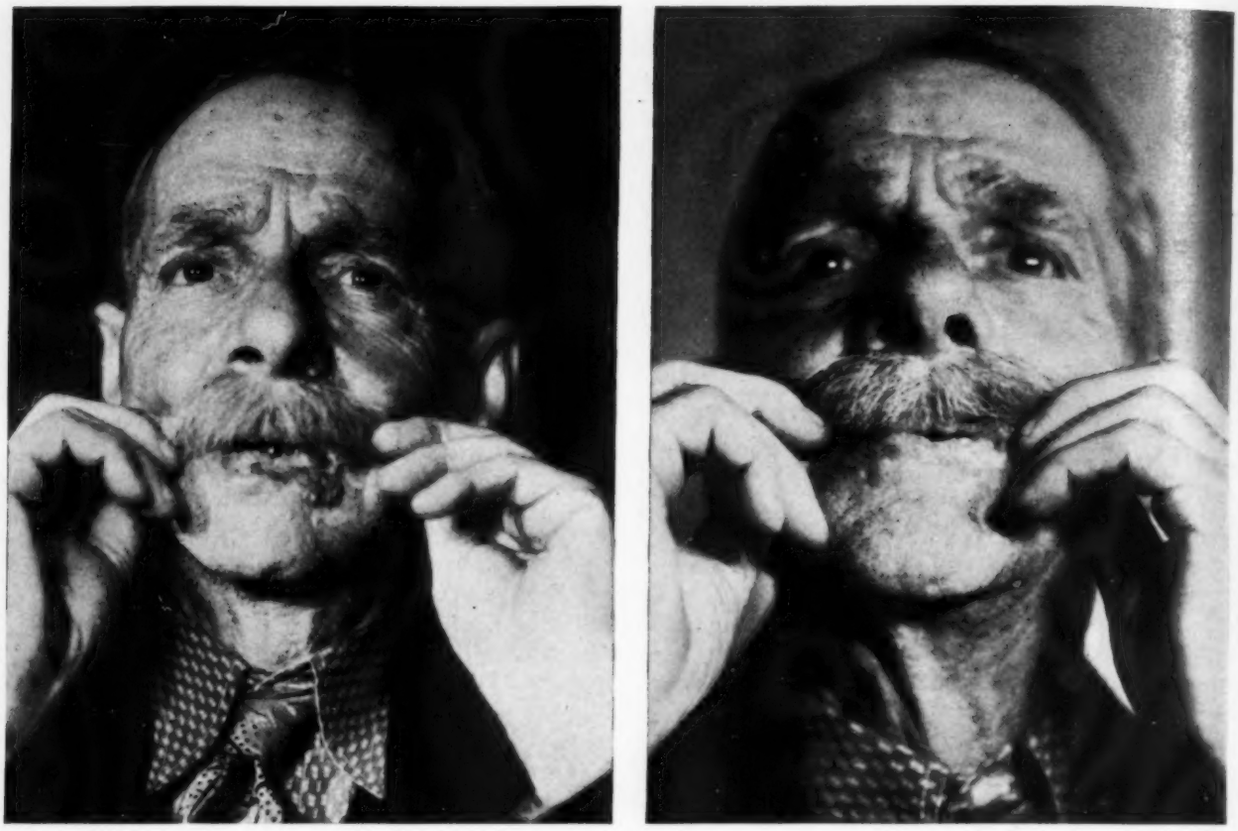


Fig. 1-A CASE No. 1 Fig. 1-B

T.M.R.; age 67; married. About 38 years ago noticed a little blister on his lower lip. Has been treated by various methods and remedies, and 12 years ago had a caustic paste applied. When first seen he presented an appearance of malignancy involving the lower lip all the way across and extending downward and outward from the left angle of the lip onto the face toward the chin, and also extending across the left angle of the mouth into the mucous membrane of the cheek. The biopsy finding in this case was "keratotic papillary epidermoid carcinoma of moderate malignancy and radio-resistant." The incrustations were removed and "APSA" applied. Fig. 1-A shows this case on the date of first treatment, and Fig. 1-B shows him 26 days later when apparently nothing remains of his malignancy but a scar.

---

antly applied them with consequential baneful results, brought great disfavor upon this line of treatment from the profession.

Various serums have spasmodically appeared, with elaborate claims as to their efficacy in the treatment of cancer. These have all failed in the final results, and John Jamieson Morton, Jr., of the University of Rochester, and the newly elected President of the American Society for the Control of Cancer, says: "As far as the medical profession knowns, serum in the treatment of cancer is of no value."

Adrenal extracts have produced no lasting beneficial results, and exudates from other cancer cases together with products from cancers themselves have not been productive of the desired effects. Any results thought to have been obtained by the use of these products appear to have been no more than those which might have followed the administration of any foreign protein. Injections of various substances into the cancer itself have been fraught with failure and followed with disastrous results. Efforts at destroying cancer cells by the use of cellular poisons and colloidal lead have met only with failure.

Concentrated specific rays, such as those produced by the x-ray and emanated from radium, are today in the highest favor with the profession, even though those who are most experienced with this form of therapy express themselves as being far from satisfied therewith. Dr. Richard L. Sutton, Professor of Dermatology at the University of Kansas School of Medicine, made a statement in 1927 to the effect that x-ray had produced greater injury than it had accomplished good in the cure of cancer, and concluded by saying: "The x-ray is not the way to combat it." Dr. Howard Kelly was one of the early experimenters with radium in cancer treatment and is reported to have admitted that the results obtained were far from satisfactory, while the statement that radium as a relief of, or the cure for, cancer had failed is attributed to Dr. John B. Deaver.

That surgery has been disappointing in its re-

Fig. 2-A CASE No. 2 Fig. 2-B

A.A.R.; age 47; married. This man developed a malignancy across the bridge of his nose and involving the inner canthi of both eyes. This patient consulted a reliable clinic where he was advised that the application of radium or treatment by the x-ray would result in total blindness, and that it was impossible surgically to remove the malignancy without the exicision of both eyes and most, if not all, of the nose. Fig. 2-A shows this man on the date that he was first seen and treated with "APSA;" while Fig. 2-B shows him when he was dismissed to return to his family and work, 39 days after his first treatment. The pathological diagnosis of this case was "primary basal cell epithelioma of nose, radio-sensitive type."

sults is attested to by the experience of practically every surgeon who has seen the radical operations for cancer followed by a return of the malignancy in situ or a metastatic condition rapidly developing in some other portion of the body. There have been many instances where no doubt could exist but that the operation has shortened, rather than prolonged, the patient's life.

In a recent address, Dr. William Mayo has been quoted as saying that the medical profession has only three things to offer to the cancer patient: surgery, x-ray and radium, but that none was the answer.

FOR many years the writer has held the view that there must exist some form of treatment for cancer which, when discovered, would prove more effective and less destructive in its action upon normal tissues than any of the methods heretofore used. The essential factor has been to find some substance so selective in its action that its effect would be exerted only upon neoplastic tissues, seeking out and destroying the new growth to the full extent of its ramifications and yet producing no ill-effect or destructive action upon the surrounding tissues.

After long study and much experimentation, an amorphous powder has been produced which is so selective in its action upon malignant tissue that it may be placed in the eye with absolute impunity where it will not even set up a conjunctivitis; dusted upon an abraded wound its action is the same as that of any surgical dressing powder; applied to the normal mucous membrane, it is inert and exerts no irritant action; taken internally, it is productive of no gastro-intestinal irritation even when relatively large doses are administered. Innocent as this product is with regard to normal tissues, the moment it comes into contact with a neoplasm it instantly becomes active in its destruc-

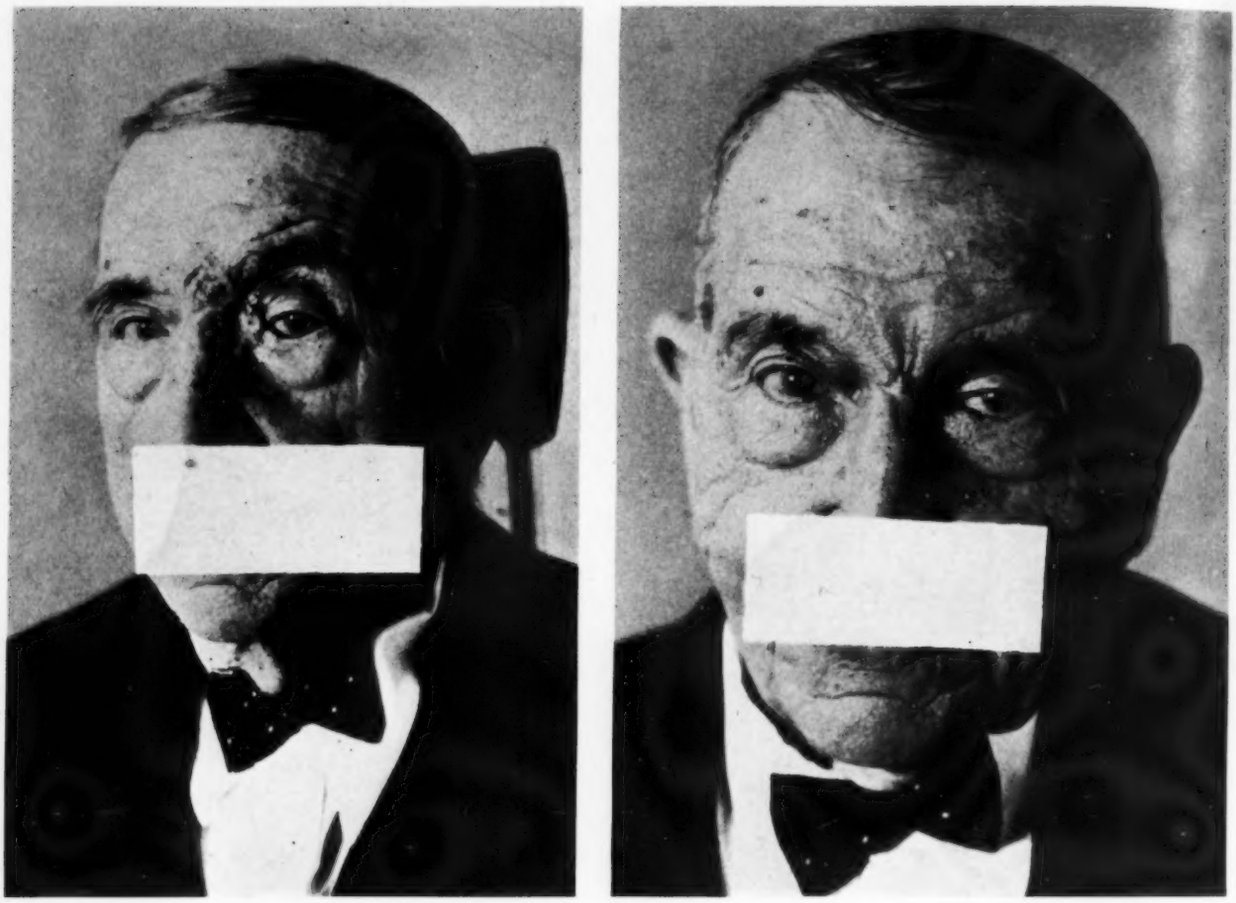


Fig. 3-A CASE No. 3 Fig. 3-B

C.R.H.; age 84; married. For 20 years he had a sore on his nose near the bridge and a little to the left side. This had grown until it extended upward as high as the eyebrows, downward to about the middle of the nose, a little over onto the right side of the nose, and into the inner canthus of the left eye. The pathological report in this case was "a basal cell epithelioma of the nose." Radium had been applied and the x-ray used, but the condition continued to grow more and more aggravated. Fig. 3-A shows the condition as seen when this man first reported to us for treatment; and Fig. 3-B shows his condition when he was discharged six weeks and two days after beginning treatment.

tive effect, resulting in the death and mummification of the cancerous growth with the formation of a definite line of demarkation when and where normal tissue is contacted. Owing to the extreme volatile property of one of the essential ingredients, it has not as yet been practicable to produce this powder in a sufficiently stable form to admit of making it generally available. Additional experimentation is being conducted with a view to overcoming this difficulty and very shortly making it possible to publish the formula and entrust its manufacture and distribution to some reliable pharmaceutical house. For the purpose of identification, this material has been designated as "APSA."

THE technique of this treatment is as follows: When small or of moderate size—up to an inch or an inch and one-quarter in diameter—the incrustation is removed and bleeding staunched by pressure. Where the lesion is of larger size, a portion only may be treated at the first operation and be followed by two or more subsequent operations until the entire malignancy has been brought under control. A small amount of "APSA" is next applied to the abraded surface by means of a pledget of cotton—which is then spread out so as to cover the denuded area and affixed in place with strips of adhesive. Generally no immediate discomfort is noted, but within an hour or so a reaction begins and a burning pain is complained of, which, within a short time, may develop to such proportions as to require the need of some analgesic, and in severe cases may even require one or two doses of morphia. Within 24 hours there appears quite an extensive edema involving the surrounding tissues for some distance beyond the area under treatment; in a case involving the hand, this swelling extended above the wrist and involved the entire hand and fingers. At the same time the area becomes painful and the patient usually complains of pain radiating away from the involved

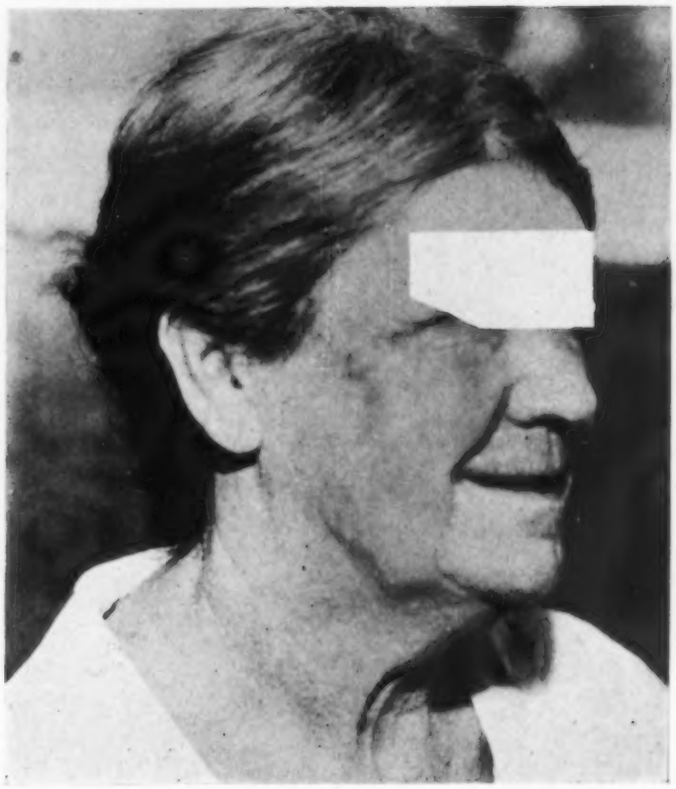


Fig. 4-A CASE No. 4 Fig. 4-B

MRS. M. H. H.; married; housewife. For four years she had noted an ulcerated condition on the right side of her face near the external angle of the eye. This had grown in size and had been treated with radium which seemed to aggravate, rather than retard, the growth. She was first seen by us on September 9—when the picture shown in Fig. 4-A was made, and treatment applied. Fig. 4-B is the same case on October 11, 1937, one month and two days later.

area. After another 24 hours the pain has usually subsided, though the edema may continue for some three or four days longer. At a period varying from about six days to two or more weeks, according to the size, location, depth and area of the original tumor, there will be noted a mummification of the tissues with a line of demarkation surrounding this dead tissue. The mummified area will extend some little distance in all directions beyond the growth, showing that the effect has been to seek out the furthest ramifications of the malignancy, apparently destroying all cancerous tissue and relenting in its action only when normal tissues have been reached. Within a few days a slough will form and the entire mass will be cast off leaving what appears to be a perfectly healthy granulating ulcer which will heal very readily under any form of surgical dressing, though our preference is to use a stimulating ointment—such as oxide of zinc. The readiness with which this healing takes place seems to be almost sufficient proof that the malignancy has been completely removed. Naturally there can be no fixed period for the appearance of the several phenomena enumerated, as each case will be a law unto itself.

If space permitted, the histories of more than 100 cases could be cited, who have been treated by the method described with entirely satisfactory results and who, according to our best judgment, present no evidence of malignancy at the time this paper is written. Time alone will be able to answer the question as to whether or not these patients are cured.

After five years have elapsed, and providing the patients live and have no recurrence of the malignancy, we might feel justified in claiming for them a cure. In the meantime we must be satisfied with the fact that these individuals present no symptom of malignancy since undergoing this treatment, appear to be perfectly healthy normal individuals, and are proceeding about their vocations and home life in the order of other normal individuals. A few cases will be cited and some illustrations given. In these, a biopsy report has been obtained in every case and the results speak for themselves.

(Cases 1 to 5, inclusive, are detailed under the illustrations in these pages. Other cases, 6 to 9, inclusive, follow.)

CASE No. 6: MRS. R.J.A.; age 52; married. When first presenting herself, this woman had a lesion on her neck about the size of a silver dollar. The pathological diagnosis was "basal cell carcinoma of neck." After six weeks of treatment she was dismissed apparently well.

CASE No. 7: MRS. M.S.; age 47; widow; seamstress. On March 8, this patient reported with a

Fig. 5-A **CASE No. 5** **Fig. 5-B**

MRS. S.H.E.; age 44; widow. For three years she had suffered from a cancer involving the left breast, and had been treated by both x-ray and radium. Axillary glands were much in evidence, and when first seen by us the cancer measured 7½ x 6¼ inches. Owing to the extensive size of the lesion, as shown in Fig. 5-A, only about one-third of the area was treated at one time. Fig. 5-B shows the same case with the wound apparently thoroughly healed and all evidences of granular involvement in the axilla absent after 16 weeks and four days of treatment. The pathological diagnosis of this case was "medullary carcinoma of breast. Type 3."

papillary epithelioma on the dorsum of the right hand. Ten days later there was an area about the size of a fifty-cent piece, which was completely mummified and showed a distinct line of demarkation. On March 23 this entire mummified area separated from the adjacent and underlying tissues and sloughed out. On April 15 the lesion had apparently completely healed.

CASE No. 8: MRS. C.D.E.; age 56; married. About 1934 or 1935, noticed a hard lump in the left breast. Six months later this began to grow rapidly and reached the size of a lemon. Shortly thereafter it ruptured and drained a thin pus, having a very disagreeable odor. Consulted a physician, who suggested amputation of the breast to be followed by applications of radium. She reported to a hospital where they stated the case was inoperable but suggested applications of radium, and frankly expressed doubt as to whether the treatment would have any beneficial effect. This case was first seen by us on April 7, when the biopsy report read: "Section of tumor from breast diagnosed as medullary carcinoma of breast. Grade 4." Treatment was administered, and, on October 28, examination showed a broad rather tight scar across the left breast which did not seem to be attached to underlying structures and no evidence of any tumor could be detected in either the breast or the axilla. This patient was again seen March 12, 1938, when she had gained considerable weight, says she felt perfectly well and healthy, and no evidence of tumor or disease could be found in either the breast or the axilla, excepting the scar above mentioned.

CASE No. 9: MRS. W.J.B.; age 46; married. Pathological diagnosis: "Carcinoma of cervix." When first seen by us, March 9, 1937, weighed only 84 pounds and was hardly able to do anything for herself. She gave the history of having noted a bloody discharge from the vagina, in the latter

part of 1935. She had some 84 hours of radium treatment but had made no improvement. Shortly after application of "APSA" she began to improve, and 29 days later there was a slough of the malignancy from the cervix. When last seen on March 12, 1938, she had every appearance of being in normal health and presented no detectable evidence of recurrence.

THOUGH many other cases could be cited, all would show histories and results similar to those above mentioned. While this treatment seems to offer the hope of a great boon to humanity, sight must not be lost of the fact that all cancers will at some time or other reach a state of development and metastasis after which nothing can be done. But with a treatment so simple as the one herein described, requiring no administration of dangerous serums or antitoxins, not subjecting the patient to the hazard and consequential inconvenience following x-ray and radium treatments, there is no reason why sufferers from this malady should not be given prompt and efficient relief which has every appearance of eliminating the malignancy by destroying the invading vegetating cells and permitting the reconstruction of normal tissue. These patients have all been enabled to resume their various vocations in life, and we hope after a lapse of time—five years—to be able to recognize that an absolute cure has been effected. In the meantime, relief from suffering, restoration to apparently normal condition of the tissues, and ability to enjoy life and the pursuit of happiness, are afforded these patients by this new line of treatment which is simple, free from danger, void of toxicity, and, according to our experience, appears to offer the brightest prospects of a cure. It is our hope that a satisfactory means of combating that dread enemy of the human race—cancer—is at hand.

The Need for Sane Thinking

IRVING S. CUTTER, M.D.

WORLD history is replete with chaotic events involving human behavior, some of which have simulated true hysteria.* The Crusades resulted from religious enthusiasm which rose to great heights in the eleventh, twelfth, and thirteenth centuries. As we view them today they were heroic exhibitions of devotion rather than campaigns carefully thought out and planned.

Even youth demanded participation and children were carried along on the crest of the wave. Their fathers had disappeared into the east—but few returning. Why should they not fly to the rescue? It is related that in the year 1212 A. D. a lad by the name of Nicholas appeared in Germany, stating that he had been sent to lead the little ones into the Holy Land. History records that 30,000 of them set out across the Alps. Many perished en route, although some finally reached Genoa. Strangely enough, the sea did not divide to let them pass and the remnants of this pilgrimage were sold as slaves to the Saracens.

French youngsters did not escape. Many gathered under the banner of a boy named Stephen who, in the same year, proclaimed that he had received a commission to conduct an army of boys and girls to Palestine. Despite the opposition of parents, thousands made their way to the Mediterranean, along the bed of which they had hoped to walk dry shod. Both were tragic episodes, costing thousands of lives.

ANOTHER medical incident—the dancing mania—followed the scourge of the Black Death. This strange delirium originated in Germany, took complete possession of the minds of individuals, and proved a magic of such power as to transcend sanity. It spread by sight—a normal person observing a dancer immediately would acquire the contagion. Hecker relates that as early as 1374 "assemblages of men and women, united by one common delusion, formed circles—hand in hand—and seemed to lose all control over their senses." They continued dancing wildly until they fell to the ground in a state of exhaustion. These attacks occurred periodically, many asserting that during the ensuing unconsciousness they saw the gates of heaven opened, permitting them to look inside.

What was this disease which afflicted so large a proportion of the population? Obviously, a frank psychosis. Suggestion was the only psychological factor needed to make reason abdicate and enthrone superstition. According to historians the effect upon the physical well being of the people was disastrous, delaying the Renaissance many generations.

Mass psychology is never characterized by sober logic, as many a sheriff who has faced an infuriated populace can testify. All that is needed is that some one shall cry, "Hang the culprit," or "Burn the jail," whereupon, as spark to tinder, the brutish power of a mob is unleased.

ARE we facing today another period of excitability wherein personal and individual responsibility is thrust into the background under the sway of fanciful dreams? Is it the siren flute of the Pied Piper of Hamelin luring us to destruction? In times of stress, emotions come to the surface like oil and we are ready to shout "aye" to every suggestion.

When the ghost dancers from the west invaded the Sioux nation with the news of the coming of a new chieftain we were not surprised. As a result of their dancing the Indians believed firmly that all their dead would arise, armed cap-a-pie, ready to drive their white foes from the land. Of course, the promised leader failed to materialize and we forgave the Sioux their error. Is our present nightmare less fanciful when we legislate against nature?

One may well wonder what education has brought to us in the way of power to retain mental poise. We must prick the bubbles of emotionalism.

---

* In "How to Keep Well," in *Chicago Tribune*, April 20, 1938; republished by special permission of The Chicago Tribune-N. Y. News Syndicate, Inc.

The June Programs

—Twenty-Third Annual Meeting of the American Asssociation of Industrial Physicians and Surgeons, and Second Annual Midwest Conference on Occupational Diseases: Tentative Programs—

THE programs for the Twenty-Third Annual Meeting of the AMERICAN ASSOCIATION OF INDUSTRIAL PHYSICIANS AND SURGEONS, and the Second Annual MIDWEST CONFERENCE ON OCCUPATIONAL DISEASES, at the Palmer House, in Chicago, on June 6, 7, 8, and 9, 1938, can now be set forth. After the Address of Welcome by HON. EDWARD J. KELLY, Mayor of Chicago, and the response by DR. R. R. SAYERS, President of the Association, the program will be pursued as follows:

Monday, June 6:

UNDER the general heading of "Industrial Hygiene," there will be these presentations:

"Plumbing as an Industrial Hygiene Problem," by MAJOR JOEL I. CONNOLLY, Assistant to President, Chicago Board of Health.

Abstract:

DRINKING water may be contaminated by cross-connections between city water and other water used for industrial or fire protection purposes. Several epidemics of disease among industrial workers from polluted water are cited. Also drinking water may be contaminated by inter-connections of the city water with tanks of poisonous chemicals, sewers, hydraulic presses, air conditioners and other fixtures. Typical cases are shown by stereopticon slides and motion pictures, and remedies described. Better still, means of prevention are outlined which have been found effective.

"The Engineer's Place in Industrial Hygiene," by WARREN A. COOK, Superintendent, Engineering Department, Zurich General Accident Insurance Company, Chicago.

Abstract:

THIS will show how the work of the engineer correlates with that of the physician in the prevention of occupational diseases and how the engineer can be most effective when he has available to him the advice and assistance of the industrial physician well versed in the medical aspects of industrial hygiene. Since one of the most difficult phases for the engineer in control of occupational diseases is the decision on the necessity, and the extent, of control measures, methods will be outlined whereby the engineer can can more definitely guide his efforts in occupational disease control.

"The Insurance Carrier and the Control of Occupational Diseases," by J. B. LAMENZO, Research Engineer, Hartford Accident and Indemnity Company, Hartford.

"The Physician's Responsibility in Industrial Hygiene," by CLARENCE D. SELBY, M.D., Medical Consultant, General Motors Corporation, Detroit.

"The Estimation of Potential Occupational Disease Hazards, and of Their Control," by J. J. BLOOMFIELD, P. A. Sanitary Engineer, U. S. Public Health Service, Washington, D. C.

"Industrial Hygiene and the Nurse," by JOANNA M. JOHNSON, R.N., Supervisor of Nurses, Employers Mutuals, Wausau, Wisconsin.

Tuesday, June 7:

THIS day's presentations include: "Contact Dermatitis," by MICHAEL EBERT, M.D., Associate Professor of Dermatology, Rush Medical College, Chicago.

"Analysis of the First 200 Cases Under the Illinois Occupational Diseases Law," by CLARK D. BRIDGES, Safety Director, Casualty Mutual Insurance Company, Chicago.

"Noise in Industry," by WALLACE WATERFALL, Fellow, Acoustical Society of America.

"Developments in Occupational Diseases Legislation," by OLIVER G. BROWNE, General Claims Attorney, New York Central System.

"Women in Industry," by M. H. KRONENBERG, M.D., Chief of Division and Industrial Medical Supervisor, State of Illinois Department of Public Health.

"Light, Vision and Seeing," by DR. M. LUCKIESH, (Director), and FRANK K. MOSS, (Physicist), Lighting Research Laboratories, General Electric Company, Nela Park, Cleveland.

"Tuberculosis in Industry," by O. A. SANDER, M.D., Milwaukee, Wisconsin.

"Employability of the Silicotic," by VOYTA WRABETZ, Chairman, Industrial Commission of Wisconsin.

Wednesday, June 8:

THE morning session will include:

"Factors Determining Reasonable and Equitable Total Disability Period," by PHILIP H. KREUSCHER, M.D., F.A.C.S., Chief Surgeon, Chicago Area, Carnegie-Illinois Steel Company, Chicago.

"Hazards of Night Driving," by HART E. FISHER, M.D., F.A.C.S., Chief Surgeon and Medical Director, Chicago Rapid Transit, and related companies.

"Syphilis in Industry," by HAROLD A. VONACHEN, M.D., Medical Director, Caterpillar Tractor Company, Peoria, Illinois.

"The Occupational Diseases Research Department of Northwestern University Medical School," by JAMES A. BRITTON, M.D., Supervisor of Medical Service, International Harvester Company, Chicago.

The afternoon session—with the Component Society participation of the ASSOCIATION FOR THE ADVANCEMENT OF INDUSTRIAL MEDICINE AND SURGERY—will include:

"Arthritis in Industry," by JOHN DEPAUL CURRENCE, M.D., New York City.

"Tuberculosis in Industry," by GEORGE G. ORNSTEIN, M.D., F.A.C.P., New York City.

"Intra-Articular Damage," by WILLIS W. LASHER, M.D., F.A.C.S., Chief Surgeon, Employers' Liability Assurance Corporation, New York City.

"Lead Poisoning in Industry," by Irving Gray, M.D., F.A.C.P., New York City.

Abstract:

THE physical findings and laboratory studies, including cardiovascular examinations will be discussed. The cases studied were all industrial in origin. The importance of a high phosphorous regime in the treatment of the acute toxic lead episode will be stressed. The necessity for occasional deleading in isolated instances, when medical legal problems are involved will be shown.

Wednesday evening will be given over to the Annual Dinner.

Thursday, June 9:

THE morning session—with the participation of the Institute of Traumatic Surgery—will include:

"A Discussion of Fat Embolism," by Carlo S. Scuderi, M.D., Chicago.

Abstract:

THE literature on fat embolism dates back to 1669, when Lower first did experimental work on animals. The contributions of Magendie, Zenker, Scriba, Landois. Lehman and Moore, and Paul and Windholz are discussed. It was then shown that quantitative total blood fat determinations are valueless in the diagnosis of this condition, and that it is not the amount of fat which causes harm but the qualitative state of the fat droplets. Small droplets (the size of a blood cell or smaller) are harmless, while droplets of over 15 microns in diameter are obstructive. Dark-field examination of the blood with chylomicron study in animals with injected oil, in humans with fractures, and those without any form of violence, shows the value of this type of study for diagnostic purposes.

A control study of 200 normal urine and blood examinations showed the fat droplets to be negative in either the blood or urine specimens. The importance of only the last few cc. of urine for fat droplets determination was shown both in vitro and by clinical injection of oil into the pelvis of the kidney in man. The results of experimental fat embolism on 11 dogs, using both oleic acid and olive oil, showed the value of chest roentgenograms in diagnosing this condition. This work will continue on patients showing symptoms of fat embolism following fractures.

To sum up, quantitative blood fat determinations are of no value in the diagnosis, because the physiolgical variations are too great; qualitative dark-field examinations of the blood should be of great aid in the diagnosis, in the hands of trained microscopists; in the urine examination of suspected cases, only the last few cc. of catheterized specimens are valuable; the uniformity of experimental results shows that intravenous fat droplets, if present in sufficient quantity will always produce changes in the lung fields, detectable by roentgen ray.

"Trauma to Blood Vessels, and Their Sequelae," by R. W. McNealy, M.D., Chicago.

"Distinction between Injuries of the Spine, Spondylitis, and Spondylosis," by John D. Ellis, M.D., F.A.C.S., Chicago.

"Pectin in the Treatment of Wounds," by James E. M. Thomson, M.D., Omaha, Nebraska.

"Metallic Fixation of Bones," by Will F. Lyon, M.D., Chief Surgeon, International Harvester Company, Chicago.

Abstract:

IN SPITE of improvements in skeletal traction and external reduction of fractures, a small percentage still requires internal fixation and some of these are best immobilized by a properly applied plate. A presentation will be made of experimental work being carried on in dogs, as well as clinical application in actual practice to illustrate the improvements suggested both in the mechanics of the application of the plates and their construction.

Symposium on Fractures

THE afternoon session will include a "Symposium on Fractures," which will be a joint meeting with the Regional Fracture Committee of the American College of Surgeons. The following presentations are scheduled:

1. Dr. Kellogg Speed (1:30-2:00 P.M.) "Fractures of the Carpal Navicular Bone." (With Lantern Slides).

2. Dr. Paul B. Magnuson (2:00-2:30 P.M.) "Prevention vs. Cure in Deformity Following Fracture."

3. Dr. Dean L. Rider (2:30-3:00 P.M.) "March Foot." (With Lantern Slides).

4. Dr. Willis Potts (3:00-3:30 P.M.) "Treatment of Fractures of the Neck of the Femur by Pinning." (With Lantern Slides).

5. Dr. Hugh McKenna (3:30-4:00 P.M.) "Treatment of Fractures of the Neck of the Femur." (With Moving Picture demonstration).

Collaborating Organizations

THE collaborating organizations now include: State of Illinois, Division of Industrial Hygiene;

Department of Public Health and Hygiene, University of Illinois College of Medicine;

Chicago Society of Industrial Medicine and Surgery;

Institute of Traumatic Surgery;

Board of Health, City of Chicago;

Occupational Diseases Research Department, Northwestern University Medical School;

Industrial Hygiene Unit, Wisconsin State Board of Health;

National Safety Council;

Greater Chicago Safety Council;

Chicago Dermatological Society;

Bureau of Industrial Hygiene, Detroit Department of Health; and

Department of Health, State of Michigan.

Bureau of Occupational Diseases, Ohio State Department of Health.

Central States Program

THE Nineteenth Annual Meeting of the Central States Society of Industrial Medicine and Surgery will be held in Springfield, Illinois, Tuesday, May 17, 1938.

The Illinois State Medical Society's Annual Convention will be held May 17, 18, and 19; and the Central States Society's afternoon session will be held in conjunction with the Surgical Section of the Illinois State Society.

The Central States' program, under the direction of Dr. James J. Callahan, Program Chairman, will be as follows:

Morning Session:

1. "Medicolegal Aspects of Occupational Diseases," by C. O. Sappington, M.D., Dr.P.H., Consulting Industrial Hygienist, Chicago.

Abstract:

IN THIS annual review of medicolegal experiences with occupational diseases, statistical comparisons will be made of the 1936 and 1937 figures with regard to compensation cases and court decisions in various states. As will be demonstrated, there are great differences.

Reference will be made to the present legislative requirements relative to coverage, and the rights of employers and employees, particularly with respect to common law actions and the availability of common law defenses. Because dust diseases continue to be important and cause the greater number of decisions, this type of occupational disease will be considered separately.

The common occupational diseases for which provisions are generally made in different states will be mentioned, and the relationship of the physician and surgeon discussed.

Summary and recommendations will provide a basis for future medical and legal procedures in this important field.

(This presentation will include lantern slides.)

2. "Recognition of Early Tuberculosis in Industry," by JAMES A. BRITTON, M.D., International Harvester Company.

Abstract:

EVERY doctor who is interested in and particularly those doing industrial medicine knows the value of early diagnosis of diseases that may or may not be directly associated with the employment of the individual concerned. Early recognition of tuberculosis in industry is not, *per se*, the problem, for the good and sufficient reason that the employee may go or be sent to the doctor after full development of the disease yet be "early" recognized. Recognition of early tuberculosis is the topic under discussion, and to that end I will confine my remarks.

3. "Industrial Solvents," by WILLIAM D. MCNALLY, M.D., Department of Medicine, Rush Medical College.

Abstract:

SINCE the widespread use of solvents in degreasing operations, dry cleaning, extractions of drugs, and since the use of one of the solvents as a fire extinguisher, there has arisen a necessity for more information regarding the health hazards, and the simple methods for their detection. As with refrigerants, the fire hazard was given first consideration with little thought of the health hazard. All volatile chlorinated hydrocarbons are poisonous. The great danger in the use of solvents lies in their ability to dissolve fats and lipoids alike in the body, skin, and in the nervous system. Some of these solvents gain access to the body by skin absorption, others by inhalation. Absorption by inhalation is the more dangerous as it comes in intimate contact with the blood and is carried to all parts of the body. The solvents may also have an irritating effect on the respiratory tract, laying one open to attacks of bronchitis and pneumonia. Some of the solvents may act very rapidly while with others the effect is retarded. The symptoms of poisoning by vapor exposure may be acute or chronic, depending upon the nature of the solvent, the concentraiton in the air, and the length of time of exposure. The plant foreman is exposed to the solvent for short periods only, while his workman is continually exposed to the solvent, therefore, the former shows no effect, while the latter, after some time, may show signs of chronic intxoication, such as loss of weight, gastro-intestinal disturbances such as anorexia, constipation, occasional diarrhea, dizziness, irritability, asthenia, and loss of muscular coordination. The symptoms of chronic intoxication may be due to damage of the central nervous system, of the liver, and of the blood-forming organs.

Unnecessary exposure of the skin to any fat solvent, should be guarded against. Exposed arms and hands should never be immersed in a solvent. In the degreasing of small parts, mechanical means should be employed. When the operation involves larger quantities of material to be degreased, exposure to the vapor may be lessened by closed systems. Consideration should be given to the selection of an appropriate solvent low in toxicity, and to the control of the concentration of the vapor in the air inhaled by the workmen. The fire hazard of each solvent must be considered along with the health hazard. Many of the solvents have been thoroughly studied, so that we now find proper safeguards employed. Because of the rapid development of new solvents, it is imperative that they be studied thoroughly as to the fire hazard, and the health hazard, before being given to the industry. Each plant physician should keep well informed about vapors and gases to which the workman is exposed, and he should cooperate with the safety engineer in reducing the health hazards to a minimum.

4. "Skin Affections in Industry, with Special Reference to the Value of the Patch Test," by CLEVELAND J. WHITE, M.D., Chicago.

Abstract:

INDUSTRIAL dermatoses constitute roughly about 60% of industrial diseases, not including actual accidents. The dermatoses are largely made up of dermatitis venenata and eczematoid dermatitides. The causative agents in the production of dermatoses in the normal skin are usually contactants; these will be reviewed in detail and the diagnostic patch tests will be properly evaluated. In eczematoid lesions the possibility of a preceding infectious agent, like ringworm, has to be considered and consequently the lesions produced by superficial fungus infections will be described. More and more non-eczematoid lesions are being observed, a specific example being the production of acneform eruptions by oils and certain types of insulation. As irritants are the most common cause of industrial dermatoses, a comprehensive review of all the pertinent literature in the last five years will also be presented, whether the irritant be mechanical, vegetable, chemical or infectious—as bacterial and fungus.

AFTERNOON SESSION:

In conjunction with the Surgical Section of the Illinois State Medical Society:

1. "Traumatic Lesions of the Spleen," by CHESTER C. GUY, M.D., Chicago.

Abstract:

FREQUENCY of ruptured spleen, penetrating wounds, crushing injuries, injuries to associated viscera; analysis of cases at the Cook County Hospital; mortality; secondary hemorrhage; cases personally observed; review of literature; diagnostic criteria; treatment.

2. "Injuries of the Right Upper Abdominal Quadrant," by PHILIP H. KREUSCHER, M.D., Chicago.

Abstract:

INJURIES to the abdominal wall are discussed and include such lesions as hematomata rupture of the muscles and fascia as well as traumatic hernia. Trauma to the liver, with or without rupture, are taken up with a report of several cases, discussing symptoms and diagnostic features of this type of injury. Post-traumatic ruptures of ulcers of the stomach or intestines are covered. Injuries to the large or small bowel from direct violence are cited. Direct and indirect violence injuring the kidney are discussed in detail.

Program at San Francisco

THE Section on Preventive and Industrial Medicine and Public Health of the A.M.A. will have the following program at the San Francisco Convention next month:

The Section meets in the City Health building.

The Officers of the Section:

Chairman—Robert T. Legge, Berkeley, Calif.

Vice Chairman—Charles V. Craster, Newark, N. J.

Secretary—I. C. Riggin, Richmond, Va.

Executive Committee—R. R. Sayers, Washington, D. C.; L. D. Bristol, New York; Robert T. Legge, Berkeley, Calif.

Wednesday, June 15—2 P.M.

Chairman's Address: Industrial Medicine of Tomorrow." Robert T. Legge, Berkeley, Calif.

"Public Health Aspects of Industrial Hygiene." R. R. Sayers, Washington, D. C.

Discussion to be opened by L. D. Bristol, New York.

"Industrial Medicine's Challenge to the Internist." R. T. Johnstone, Los Angeles.

Discussion to be opened by Leopold Brahdy, New York.

"Medical Supervision of Benzene Plant Workers," (Lantern Demonstration). A. G. Kammer, Indiana Harbor, East Chicago, Ind. Discussion to be opened by Peter K. Knoefel, Louisville, Ky.

"Noise and Its Injurious Effects on Human Beings," (Lantern Demonstration). Carey P. McCord, Detroit.

Discussion to be opened by Vern O. Knudsen and Norman A. Watson, Los Angeles.

Thursday, June 16—2 P.M.

"Maryland's Program for the Control of Tuberculosis." R. H. Riley, Baltimore.

Discussion to be opened by W. P. Shepard, San Francisco.

"Hematogenous Tuberculosis and Silicosis," (Lantern Demonstration). Louis Cohen, Philadelphia.

Discussion to be opened by A. J. Lanza, New York.

"Studies of the Mechanism of Intranasal Infections." Charles Armstrong, Washington, D. C.

Discussion to be opened by Edwin William Schultz, Stanford University, Calif.

"Two and One-Half Years of Pneumonia Control in New York State," (Lantern Demonstration). Edward S. Rogers, Albany, N. Y.

Discussion to be opened by Peter Irving, New York.

"Cold Vaccines: An Evaluation Based on a Controlled Study," (Lantern Demonstration). H. S. Diehl, A. B. Baker and Donald W. Cowan, Minneapolis.

"Recent Researches in Nutrition in Relation to Preventive Medicine," (Lantern Demonstration). Nina Simmonds, San Francisco.

Discussion to be opened by M. J. Rosenau, Chapel Hill, N. C.

Election of Officers.

Friday, June 17—2 P.M.

"Coccidioidomycosis: The Preliminary Acute Infection with Fungus Coccidioides," (Lantern Demonstrations). Ernest C. Dickson, San Francisco.

Discussion to be opened by K. F. Meyer, San Francisco.

"Health of the Migrant." W. M. Dickie, Berkeley, Calif.

Discussion to be opened by Myrnie A. Gifford, Bakersfield, Calif.

"The Next Great Battle for Soldiers of Medicine." Henry A. Luce, Detroit.

Discussion to be opened by J. N. Baker, Montgomery, Ala.

"The Contribution of Mental Hygiene to Education on the Elementary Level." James Houloose, Long Beach, Calif.

Discussion to be opened by Herbert R. Stolz, Oakland, Calif.

"Some Physiologic Concepts in Mental Hygiene." Forrest N. Anderson, Los Angeles.

Chicago Medical Society

—"Special"—

Enroute to the

American Medical Association Convention

San Francisco, California, June 13-17

"MAKE arrangements to join our group and enjoy the privilege of traveling with your professional friends enroute."

For the comfort and convenience of members of the Chicago Medical Society, their families and friends, special arrangements have been completed with the Milwaukee Road, and the Union Pacific and Southern Pacific Railways for the operation of a DeLuxe "Chicago Medical Society Special" train, to leave Chicago from the New Union Station, Canal and Adams Streets, at 9:00 P.M., Standard Time, Thursday, June 9, arriving San Francisco at 8:30 A.M., Sunday, June 12.

The "Chicago Medical Society Special" will be composed of the most modern type Pullman air-conditioned standard sleeping cars with lowers, uppers, compartments, drawing rooms, single and double bedrooms, club-lounge and observation car features, and all the refinements associated with a deluxe type special, including diner serving choice foods appetizingly prepared at moderate prices.

The train will be operated on a fast schedule, and no excess fare will be involved, regular rates applying throughout. Rates for accommodations from Chicago to San Francisco, will be as follows:

The first-class round trip reduced rail fare going via route of the C.M.S. special and returning via either Los Angeles or via Portland and Seattle, will be $90.30. If return is desired via Canadian Lines fare will be $95.30. Lower berth cost from Chicago to San Francisco will be $15.75; upper, $12.60; compartment, $44.50; drawing-room, $56.00 and double bedroom $31.50.

The departure of the special from Chicago is timed to leave *after the close* of the meetings of the American Association of Industrial Physicians and Surgeons on June 9.

The trip to San Francisco, the Convention City, offers a splendid opportunity to combine the same with an extended vacation tour. California and the wide open spaces of the great west offer unlimited possibilities for enjoyable recreation.

Reservations on the "Special" will be gladly accepted at any time and will receive the most careful attention. Address V. L. HITZFELD, Chairman, Train Arrangements Committee, Chicago Medical Society, 30 North Michigan Ave., Chicago.

Section on Railway Surgery

THE SECTION ON RAILWAY SURGERY, of the Southern Medical Association will hold its Annual Meeting in Oklahoma City, Oklahoma, November 15-18, 1938. DR. GEORGE A. TRAYLOR, of Augusta, Georgia, is Chairman of the Section; DR. OLIVER B. ZEINERT, of St. Louis, Missouri, is Vice-Chairman; and DR. JAMES W. DAVIS, of Statesville, North Carolina, is Secretary. The program of this meeting, subject to certain additions, is as follows:

1. "Chairman's Address," by DR. GEORGE A. TRAYLOR, Augusta, Georgia.

2. "The Treatment of Fractures of the Hip," by DRS. LAWSON THORNTON and CALVIN SANDISON, Atlanta, Georgia.

3. "Abdominal Distention and Intestinal Obstruction Following Skeletal Injuries," by DR. THOMAS G. ORR, University of Kansas, Kansas City, Kansas.

4. "Railroad Surgeons, as I Know Them in the Communities They Serve," by MR. JAMES J. DONOHUE, General Claims Attorney, Louisville & Nashville Railroad, Louisville, Kentucky.

5. "Eye Examinations in Railroad Service," by DR. H. vH. THATCHER, Stevens Building, Portland, Oregon.

6. "The Diagnosis and Treatment of Mastoid," by DR. B. C. DYER, Atchison, Topeka & Santa Fe Railway, Topeka, Kansas.

7. "Head Injuries," by DR. A. W. ADSON, Mayo Clinic, Rochester, Minnesota.

8. "Improved X-Ray Technique in Studying Knee Joints," by DR. E. C. HOLMBLAD, 28 East Jackson Boulevard, Chicago.

The profession is invited; the meeting, as the program indicates, will be of profound interest to *all* physicians and surgeons, as well as those engaged in railroad work.

Educational Activities

—of the Occupational Disease Department, Northwestern University Medical School—

UNDERGRADUATE TEACHING:

A. Formal Lectures:

1. Industrial Medicine. Three one-hour lecture periods per year presented to the Senior Class by DR. JAMES A. BRITTON.

2. Junior Medical Instruction—The principal occupational diseases are covered in the various sections by several instructors.

B. Student Dispensaries:

1. Occupational Disease Clinic. One two-hour period each week is devoted to a discussion of some phase of industrial medicine. A group of Senior students in their hospital clerkship quarter are regularly assigned to this dispensary.

2. Other outpatient dispensaries hold clinics on specific a spects of Occupational Diseases:

1. Dermatology.
2. General Medicine.
3. Neurology.
4. Chest.

GRADUATE:

Medical Council monthly meetings: Discussion of topics on industrial medicine and reviews of recent literature are presented.

House Staff meetings (Passavant Hospital)—Case studies are presented to the resident staff.

Hospital Staff meetings have been presented at Passavant, St. Luke's, and Norwegian American Hospitals.

Conferences with medical representatives of contributing companies. Requests for information submitted by them have been answered.

Symposium.

CLINICS:

Outpatient department—Two two-hour periods of clinics weekly.

Hospital—Cases studied at the Passavant Memorial Hospital.

SURVEYS:

Plant surveys—medical aspects are undertaken when requested and as a part of the study of individual hospital cases.

Council on Industrial Health

IN ACCORDANCE with instructions received from the House of Delegates at the Atlantic City session in 1937, the Board of Trustees has established a Council on Industrial Health with the following official personnel: DR. STANLEY J. SEEGER, Chairman, Milwaukee; DR. HARVEY BARTLE, Philadelphia; DR. L. D. BRISTOL, New York; DR. WARREN F. DRAPER, Washington, D. C.; DR. LEROY U. GARDNER, Saranac Lake, N. Y.; DR. MORTON R. GIBBONS, San Francisco; DR. H. H. KESSLER, Newark, N. J.; DR. A. J. LANZA, New York; DR. A. D. LAZENBY, Baltimore; DR. EARL D. OSBORNE, Buffalo; DR. C. W. ROBERTS, Atlanta; DR. C. D. SELBY, Detroit; and DR. C. M. PETERSON, Secretary, Chicago.*

The Board of Trustees had recognized the need for establishing measures whereby the American Medical Association might be in position to aid in the solution of important problems that have arisen in the field of industrial health. The Section on Dermatology and Syphilology had interested itself intensively in the study of industrial dermatoses and had adopted a report of a special committee of the section asking for the cooperation of the Association in the establishment of a clearing house for the accumulation and recording of information on industrial dermatoses.

In March, 1937 the Board of Trustees invited a relatively large group of physicians who were

* *J.A.M.A.*, April 30, 1938.

known to have had wide experience in the field of industrial health to participate in a conference at the Association's offices. The discussions at this conference, which occupied an entire day, dealt with many important problems, and it was the unanimous opinion of the consulting group that the unanimous opinion of the consulting group that the American Medical Association should establish the Council on Industrial Health. At the Atlantic City session in June, 1937, the Board of Trustees was authorized by the House of Delegates to proceed with organization of the Council as a standing committee of the Board fo Trustees.

The Council on Industrial Health held its first meeting on December 10, 1937, at which a consideration was given to the details of organization and to a discussion of the possible functions that might be assumed and of the scope of work to be undertaken. Committees were appointed to report at a later meeting of the Council, which was held in Chicago on March 26, 1938. At the second meeting, as the result of recommendations submitted by these committees, plans for the initial activities of the Council were adopted. These plans involve investigations of present activities in the field of industrial health on the part of various groups and organizations, including governmental agencies, industries, labor organizations and other interested groups.

It is the intention of the Council on Industrial Health to establish and to maintain official contact with constituent state medical associations. These associations will be requested to create committees on industrial health to cooperate with the Council in the study of problems with which that body may be properly concerned, in compiling information and in developing methods and measures that may enable the American Medical Association to make helpful contribution toward the solution of these important problems.

The Council hopes that it will be possible to arrange for an annual conference on industrial health to be held in Chicago. Committees were appointed to undertake the preparation of special articles that may be published in The Journal of the American Medical Association. The Council on Industrial Health will endeavor to establish close cooperative effort with the Council on Medical Education and Hospitals for the purpose of promoting graduate facilities in the field of industrial health. One committee is engaged in the important task of studying nomenclature, and this committee will attempt to lay the ground for a standard nomenclature in the particular field with which the Council is concerned. Another important activity of the Council will be concerned with a study of those provisions of compensation laws which may have a direct bearing on industrial health.

Summary: The Council on Industrial Health, organized in December 1937, has held two official meetings and has developed a working organization through the appointment of a secretary and the creation of official committees. Articles dealing with various subjects of major importance in the field of industrial medicine are in course of preparation for publication. The Council has adopted official rules and is proceeding as rapidly as possible, with due conservatism, toward the prosecution of plans that have been officially adopted.

American Railway Surgeons

The American Association of Railway Surgeons will hold its Forty-Ninth Annual Meeting at the Palmer House, in Chicago, on September 19, 20, and 21, 1938.

Dr. Harvey Bartle, Chief Surgeon of the Pennsylvania Railroad is President of the Association; Dr. T. L. Hansen, Chief Surgeon of the Rock Island Lines, is Treasurer; and Dr. D. B. Moss, Chief Medical Officer of the Burlington Lines, is Secretary.

Scientific and commercial exhibits will be an attractive feature of this convention. The program of the sessions will be announced in an early issue of this magazine.

Industrial Hygienists Society

—Michigan—

The Michigan Society of Industrial Hygienists was founded on March 10, 1938. The organization comprises a membership of an inter-professional group representing engineers, physicians, nurses, teachers, technicians, industrial hygienists, etc. The purpose is to engage in activities and programs conducive to the acquisition of increased knowledge of industrial hygiene, industrial medicine, industrial safety, and all other aspects of industrial health conservation.

A Dinner Meeting will be held, at the Detroit-Leland Hotel, on May 25, with Dr. John J. Prendergast, Medical Director of the Chrysler Corporation, Presiding Chairman. The dinner follows the Occupational Disease Session of the Michigan State-wide Safety Conference. The Session has the following program, under the Chairmanship of Albert E. Meder, General Counsel, Michigan Manufacturers Association, Detroit:

A Symposium covering the State, Legal, Engineering and Medical Aspects, and Current Problems which have developed since the Act became effective:

1. "The Law and Its Application and Administration to Industry."
2. "The Legal Aspects of the Law."
3. "The Application of Engineering Technique for the Prevention of Occupational Diseases."
4. "A Medical Program for the Control of Occupational Diseases."

The participants include:

George A. Krogstad, Commissioner, Michigan Department of Labor and Industry.

L. J. Carey, Attorney-at-Law, Michigan Mutual Liability Co.

Dr. Francis R. Holden, Pittsburgh Plate Glass Co., Pittsburgh.

Dr. C. D. Selby, Medical Consultant, General Motors Corporation.

Industrial Medicine

Reg. U. S. Pat. Off.

The Journal of Traumatic Surgery and Occupational Diseases

Executive and Publication Offices
413 Pleasant Street, Beloit, Wis.

Eastern Offices
110 East 42nd St., New York City

Editorial Offices
540 No. Michigan Ave., Chicago, Ill.

CONSULTANT:
C. O. SAPPINGTON, M.D., DR.P.H.

MANAGING EDITOR:
A. D. CLOUD

EDITORS:
S. O. BALCK, M.D.
JAMES T. CASE, M.D., F.A.C.S.
VOLNEY S. CHENEY, M.D., F.A.C.S.
BRADLEY L. COLEY, M.D., F.A.C.S.
JOSEPH JORDAN ELLER, M.D.
HART E. FISHER, M.D., F.A.C.S.
JOHN G. FROST, M.D., F.A.C.S.
OTTO P. GEIER, M.D.
WILLIS W. LASHER, M.D., F.A.C.S.
WM. D. MCNALLY, M.D.
M. N. NEWQUIST, M.D.
HORACE W. PORTER, M.D.
FREDERICK W. SLOBE, M.D., F.A.C.S.
E. A. VANDER VEER, M.D.

VOLUME 7 MAY, 1938 NUMBER 5

A New Hope for Cancer

FULLY aware of what he is doing, DR. J. R. GARNER. of Atlanta, Georgia, Railroad Chief Surgeon, and Professor of Forensic Medicine at the University of Georgia School of Medicine, makes public in this issue (pp. 265-271) the principles, technique, and certain successful results, of a new treatment for cancer.

He uses a substance "selective in its action upon malignant tissue," but harmless to normal tissues. And he describes nine cases, five with illustrations, and says: "If space permitted, the histories of more than 100 cases" could be given, which have been treated by this method "with entirely satisfactory results" — thus far only, for the treatments were comparatively recent, and, in *his* words: "Time alone will be able to answer the question as to whether or not these patients are cured. After five years have elapsed, and providing the patients live and have no recurrences of the malignancy, we *might* feel justified in claiming for them a cure. In the meantime we must be satisfied with the fact that these individuals present no symptom of malignancy since undergoing this treatment, appear to be perfectly healthy normal individuals, and are proceeding about their vocations and home life in the order of other normal individuals."

The conservatism of these expressions, the reluctance to suggest more than the "might" (italicized above), and the concluding statement: "We *hope* after a lapse of time—five years—to be able to recognize that an absolute cure has been effected"—these, together with the imminent availability of the "selective substance" through a "reliable pharmaceutical house," suggest very strongly that interest and curiosity should precede skepticism in the reception of what DR. GARNER has to offer.

Anyone familiar with such things can forecast many, if not most, of the reactions an announcement of this kind will call forth. Regardless, however, of what they may be, we commend DR. GARNER'S title: "A New Treatment: Holding Much Promise," and wish that we might have been able to print the case histories and illustrations of all the more than 100 benefitted by the treatment up to now. Whether time will prove them cured or not cured, there is the fact that they have been helped. And that is more than something: it is a very great deal.

The Industrial Background

THREE new members have been added to the Council on Industrial Health of the A.M.A.: DR. L. D. BRISTOL, Health Director, American Telephone & Telegraph Company, since 1929; DR. A. J. LANZA, Assistant Medical Director, Metropolitan Life Insurance Company, since 1926; and DR. C. D. SELBY, Medical Consultant, General Motors Corporation, since 1934. All three are well and widely known in industrial medical circles. DR. BRISTOL is the author of "Industrial Health Service," published in 1933, still the outstanding textbook on the subject; has been A.M.A. Chairman of the Section on Preventive and Industrial Medicine and Public Health; and is distinguished for, among other things, "his interest in, and effective organization and establishment of, public and industrial health programs." DR. LANZA is a pioneer in the investigation of industrial dust hazards in the United States, and has had a long and instructive experience in investigations in industrial hygiene. DR. SELBY'S industrial affiliations began in 1905, and have been continuous since—with an importance and variety productive of wisdom and good judgment. He is President-elect of the AMERICAN ASSOCIATION OF INDUSTRIAL PHYSICIANS AND SURGEONS.

Several other members of the Council are members of the A. A. I. P. & S. DR. HARVEY BARTLE, Chief Surgeon of the Pennsylvania Railroad, is President of the AMERICAN ASSOCIATION OF RAILWAY SURGEONS. DR. A. D. LAZENBY has been Chief Surgeon for Maryland Casualty Company since 1921.

The Council on Industrial Health is proceeding "as rapidly as possible, with due conservatism," toward the prosecution of its plans. With the first-hand *industrial* medical background represented by the experiences of these men as its guide, it could proceed very rapidly and still be noted for the permanent quality of its work.

Occupational Diseases and Industrial Surgery

Syphilis of the Eye as a Factor in Industry

PARK LEWIS, M.D., F.A.C.S.

AN INDUSTRIALIST who is one of the largest employers of labor in this country, recently asserted that future gains in industry would not result from lowering wages nor the limiting of production but from improvements in machinery and keeping those machines that were in use in the highest state of efficiency.* The small savings that may be thus effected can constitute the whole margin of profit in this age of keen competition. The most important machine in any factory is the man who runs it. Life today is going at great speed. For a man who is in charge of a powerful piece of mechanism such as a railroad engine with a heavy train behind it, it is absolutely essential that he shall have good sight and quick mental reactions. This of course is equally true of every truck driver and of every air pilot.

It is not at all unusual for trains with 12 or 15 cars attached to cover long stretches of the road at the speed of a mile a minute. The momentum of these great masses of matter is such that they cannot be stopped, without considerable shaking up of the passengers, within less than a mile. That is equivalent to 1300 feet in 15 seconds. The engineman, consequently, must keep his eyes on the signal lights as they appear. On such a run, the eyes of the engineer must not leave the road. Such concentrated effort cannot be long maintained, so that the hours of each run, before relief comes, are comparatively short. It will be evident, then, in such a position of responsibility that not only must the sight and hearing be adequate, but the mental and muscular responses must be immediate. Anything that can affect these responses should receive attention.

Neurosyphilis is a condition in which the nerve centers and the nerve structures are especially affected and all the reactions are slowed down. An examination with the vision card may show no apparent loss of sight, but the visual and auditory nerves of a man with neurosyphilis become dulled. When tested with the colored wools, he will pick out the stronger primary colors—greens and yellows and blues—he hesitates over the reds. Red is the danger signal. He refuses it with the drabs. His responses to a like test made a year before were immediate. His reading glasses which may have been properly chosen for him, are becoming inadequate. He is requiring more light for seeing to read. Occasionally, on looking at distant objects, he sees double. His eyes have what writers call a "steely" cast, that is, the pupils are small and do not enlarge readily when the light is dim as they normally should, or perhaps the pupil of one eye is large and black while the other is smaller than usual. In the latter case he will have periods of abstraction in which he will seem to be thinking of something other than the matter in hand, or fail to hear when spoken to. At times he will look without seeing and listen without hearing.

These are some of the fortunate early symptoms of syphilis involving the nervous system, fortunate, because they are some of the premonitory symptoms that, unless controlled by proper treatment, will inevitably lead to incurable organic changes. They may anticipate these later changes by months or even years. There may be no indication in casual conversation that the subject of the slowly oncoming changes is other than in perfectly normal health, but this is the time in which treatment may still be successfully employed.

Shortly the pupils will become fixed and small. One eye may turn out. The double vision which may have been present, will become less troublesome because the sight will have grown less and the optic nerve atrophied. The feet will no longer feel the ground in walking and a stick will be necessary for balance and support. Then locomotor ataxia will be fully developed, or, should the brain receive the greater amount of damage rather than the spine, unwarrantable optimism, cheerfulness, delusions of grandeur will be followed by ultimate dementia. It has been estimated that there are at least 50,000 people in the United States suffering from locomotor ataxia in advanced form. Twice in the writer's experience highly intelligent men, who had filled important positions, and who lacked the courage to meet blindness and physical incapacity, sought relief in suicide.

To industrialists, then, it is of first importance to know that syphilis is a constitutional disease, of which those suffering from it may be totally unconscious, subtle in its advent and protean in its manifestations. With other physical changes, any tissue of the eye may be affected. Through the vascular system persistent inflammations that occur notwithstanding treatment should always suggest the possibility of syphilis being their background. The fact that iritis may block the pupil and destroy the sight, through a frequent accompaniment of rheumatism, may not excuse overlooking the possibility of there being an underlying syphilitic basis.

A Rumanian authority has found that one-third of the eye syphilitic cases in clinics result in blindness. It is of great importance to industrialists to realize that the presence of syphilis may increase the severity of accidents and injuries to the eyes. Little cuts and bruises of the cornea that would otherwise pass unnoticed, may become extensive ulcers with iritic involvements and a consequent lowering of the sight to a point of economic blindness, which carries with it the full indemnity for complete loss of sight. The courts have held that the existence of syphilis does not lessen the responsibility of the insurance carrier unless it can be definitely shown that the loss of sight would have progressed even if the injury had not occurred.

A VERY fortunate condition of syphilis, however, particularly that involving the nervous structures, is that its earliest manifestations are often shown in the eyes and may be readily seen, and that the recognition of some of these prodromal symptoms does not require the skill of an expert or a specialist. The changes in the pupillary reactions to which reference has been made, can be readily seen by any careful observer and while they are not in themselves satisfactory evidence of the existence of syphilis, for these changes may have been produced from other causes, they should at once indicate the necessity of having a blood test made. If the reaction is positive, this will certify as to the existence of the disease, although syphilis may be present even when the Wassermann is negative.

Another fortunate circumstance connected with the disease is its complete curability if the treatment is undertaken at a sufficiently early period, and also the stopping of the progress of the disease even if damage has already occurred to tissues that may be beyond repair.

How extensive syphilis is in industry may be gathered from a very few statistics. Unfortunately they are limited because no systematic effort has been made to have the blood examined as it should be in the case of everyone engaged in any activity whatsoever. In 36,000 employees of the Du Pont de Nemours works in New York, New Jersey and Dela-

—*Continued on page 281.*

* Presented at the Section of Industrial Hygiene, Public Health Nurses, and National Society for the Prevention of Blindness, Wednesday, October 6, Annual Meeting of the American Public Health Association; published in *The Sight-Saving Review*, December, 1937.

THE AMERICAN ASSOCIATION

of

INDUSTRIAL PHYSICIANS and SURGEONS

Component Societies

Central States Society of Industrial Medicine & Surgery

Association for the Advancement of Industrial Medicine & Surgery

THE object of this Association shall be to foster the study and discussion of the problems peculiar to the practice of industrial medicine and surgery; to develop methods adapted to the conservation of health among workers in the industries; to promote a more general understanding of the purposes and results of the medical care of employees, and to unite into one organization members of the medical profession specializing in industrial medicine and surgery for the mutual advancement in the practice of their profession.

OFFICERS

President: Dr. Royd R. Sayers,
U. S. Public Health Service, Washington, D. C.

President-elect: Dr. Clarence D. Selby,
General Motors, Detroit, Michigan

1st Vice-Pres.: Dr. McIver Woody,
Standard Oil Co., New York City

2nd Vice-Pres.: Dr. Daniel L. Lynch,
New England Telephone & Telegraph Co.,
Boston, Massachusetts

Sec'y-Treas.: Dr. Volney S. Cheney,
Armour & Company, Chicago

DIRECTORS

1936-1938	1937-1939
Dr. Floyd E. Shaffer, Bethlehem Steel Co., Sparrows Point, Md.	Dr. Alfred H. Whittaker, Insurance Companies, Detroit, Mich.
Dr. John J. Wittmer, 4 Irving Place, New York City	Dr. Edward C. Holmblad, Railway Express Agency, Chicago, Ill.
Dr. George H. Gehrmann, Du Pont Company, Wilmington, Del.	Dr. Robert P. Knapp, Cheney Brothers, South Manchester, Conn.
Dr. Thurman H. Lautenschlager, Dayton Industrial Surgery, Dayton, Ohio	Dr. Otto P. Geier, Cincinnati Milling Machine Co. Cincinnati, Ohio
Dr. Archibald W. George, Packard Motor Car Co., Detroit, Mich.	Dr. Andrew M. Harvey, Crane Company, Chicago, Ill.
Dr. Loyal A. Shoudy, Bethlehem Steel Co., Bethlehem, Penna.	Dr. C. F. N. Schram, Tennessee Eastman Corp., Kingsport, Tenn.

PROGRAM COMMITTEE

Edward C. Holmblad, M.D., *Chairman*
Volney S. Cheney, M.D.
Andrew M. Harvey, M.D.
Wm. D. McNally, M.D.
Clarence O. Sappington, M.D.
Fred W. Slobe, M.D.
Frank P. Hammond, M.D.

ANNUAL MEETING

THE 1938 Annual Meeting of the American Association of Industrial Physicians and Surgeons, and the 1938 Midwest Conference on Occupational Diseases, will be held at the Palmer House, Chicago, June 6, 7, 8 and 9, 1938.

Proposed Amendments

IT IS proposed to amend the Constitution and By-Laws of the American Association of Industrial Physicians and Surgeons as follows:

Article III. Sec. 1: Membership:

Membership in this Association shall be of four classes:

(a) Active: Only physicians who are actively engaged in the practice of Industrial Medicine and Surgery or who are engaged in the investigation of industrial medical problems shall be eligible to active membership.

(b) Associate: Other physicians and individuals who are not physicians but whose work or activities bring them within the realm or province of the industrial physician, shall be eligible to associate membership.

(c) Honorary: Any person who has contributed distinguished service to the objects for which the Association stands shall be eligible to honorary membership.

(d) Fellowship: Active members of the Association and of its component societies, after two years of membership in the Association or their respective societies, may apply for Fellowship. Fellowship will be conferred by the Board of Directors upon applicants who have been actively engaged in the practice of Industrial Medicine for at least five years and shall successfully pass an examination to determine that they are fully qualified to practice Industrial Medicine and Surgery.

A suitable certificate, attesting that they are "qualified in the Art and Science of Industrial Medicine," will be issued by the officers to those upon whom Fellowship has been conferred.

Amend the By-Laws as follows:

Article II. Sec. 1: Dues:

In line two, after 'per year', add: "except where a special arrangement is made with an organized group to come in as a body."

Article V. Committees: Add Sec. 4:

The President shall appoint an Examining Committee to pass upon the qualifications of applicants for Fellowship.

A further amendment is offered, to change the beginning of the fiscal year of the Association from January 1 to July 1, of each year.

These proposals will be presented, for appropriate action, at the Twenty-Third Annual Meeting, in June, 1938.

—*Continued from page 279.*

ware, 4.2% gave positive reactions. It is startling to learn that 10% of the 300 food handlers examined in New York were found to have syphilis, but a single treatment would render them non-infective. Of 2,372 American-born coal miners in West Virginia, 5.1%, and of 778 foreign-born, 6.4%, gave positive Wassermans. In the negro sections of the South and in the tobacco and cotton regions where living conditions are the worst, and where crowded, filthy cabins and undernourishment are the rule, the United States public health survey showed that from 12 to 35% of those engaged in industry or agriculture were syphilized.

There is a very close relation of syphilis to the slums, although it is found in a cross-section of every grade of society. But in the insanitary tenements where families are huddled in a single room, where cleanliness is almost unattainable, infection from one member of the family to another is almost impossible to avoid. The statistician of the health board of the city of Buffalo, speaking of the effect of insanitary quarters in the transmission of the disease, said that, given the amount of tuberculosis in any area of the city, he could estimate within 4% the number of cases of syphilis that would be found in that same area!

The statistics as to the incidence of syphilis in industry are still exceedingly limited, and the proportion of those who have syphilis whose eyes will be affected has been even less fully determined. In a study made in New York City of 100,000 case records, the estimate is made that 10% of the adult population will, upon examination, reveal evidence of syphilis, either active or latent; and Stokes estimates that 25 to 35% of persons who have syphilis will show distinct lesions of the eye or its associated mechanism during its course.

ONE would think that a subject of such vital importance to industry would cause a general awakening as to its recognition and control. The inquiry was made of the medical director of one of the greatest railroad lines of this country as to the amount of eye syphilis the records of the road disclosed. He writes: "I am very sorry to inform you that we have no records of the invasion of the eye by syphilis. We hope as years go by that we may eventually have something worthwhile."

If at the time the visual tests were made of those employees, there had also been a blood examination, the proportion infected with syphilis could have been determined and the average length of life of such employees might have been increased by 10 years. The indemnities which the road had been obliged to pay, it may be safely estimated, would be reduced by 20%. The savings would be greater by the preservation of these human machines than all the

AMERICAN ASSOCIATION of RAILWAY SURGEONS

1937 - 1938

Officers

President ..... Harvey Bartle, M.D., Philadelphia, Penn.
Vice-President ..... Frank Dinnen, M.D., Cleveland, Ohio.
John Hayden, M.D., Kansas City, Mo.
Willis C. Campbell, M.D., Memphis, Tenn.
Treasurer ..... T. L. Hansen, M.D., Chicago, Ill.
Secretary ..... D. B. Moss, M.D., Chicago, Ill.
(Phone WABash 2345)

Executive Board

G. G. Dowdall, M.D. ..... Chicago, Ill.
John R. Nillson, M.D. ..... Omaha, Nebr.
J. G. Frost, M.D. ..... Chicago, Ill.
A. R. Metz, M.D. ..... Chicago, Ill.
W. J. Lancaster, M.D. ..... Wilmington, N. C.
W. A. McMillen, M.D. ..... Charleston, W. Va.

ASSOCIATION OF SURGEONS OF THE NEW YORK CENTRAL SYSTEM

OFFICERS

President:
H. G. Farmer, M.D.

Vice-Presidents:
R. R. Ryan, M.D.
C. E. Case, M.D.
B. J. Larkin, M.D.
J. B. Bradley, M.D.

Secretary-Treasurer:
H. A. Fathauer

Office of Secretary-Treasurer
413 LaSalle Street Station,
Chicago, Illinois.
Telephone WABash 4200

EXECUTIVE COMMITTEE

B. L. Coley, M.D., F.A.C.S.
Chief Surgeon, New York City
L. A. Ensminger, M.D., F.A.C.S.
Chief Surgeon, Indianapolis
H. A. Fathauer,
Secretary-Treasurer
George P. Myers, M.D., F.A.C.S.
Medical Director, Detroit
F. E. Pierce, M.D., F.A.C.S.
Chief Surgeon, Chicago.
S. B. Taylor, M.D., F.A.C.S.
Chief Surgeon, Columbus
G. R. Winters, M.D., F.A.C.S.
Chief Surgeon, Pittsburgh
H. G. Farmer, M.D.,
Watertown, N. Y.

Oliver G. Browne, General Claims Attorney

ASSOCIATION OF SURGEONS OF THE SOUTHERN RAILWAY SYSTEM

OFFICERS

President:
J. C. Austin, M.D.
Knoxville, Tenn.

1st Vice-President:
W. H. Frampton, M.D.,
Charleston, S. C.

2nd Vice-President:
J. H. Allen, M.D.,
Rutherford, Tenn.

3rd Vice-President:
D. S. Middleton, M.D.,
Rising Fawn, Ga.

4th Vice-President:
F. Webb Griffith, M.D.,
Asheville, N. C.

Secretary-Treasurer:
Edith A. Foltz,
Office of Treasurer
Railway Building,
Washington, D.C.

Recording Secretary:
W. W. Harper, M.D.,
Selma, Ala.

Asst. Recording Secretary:
W. H. Blake, M.D.,
Sheffield, Ala.

Glenn I. Jones, M.D., Chief Surgeon,
Washington, D.C.

The Industrial Doctor

OFFICIAL SECTION OF THE NEW YORK STATE SOCIETY OF INDUSTRIAL MEDICINE

Published under supervision of the Ways and Means Committee of the New York State Society of Industrial Medicine. Editorial office, F. E. Redmond, Managing Editor, 361 Delaware Avenue, Buffalo, N. Y. Articles appearing herein do not necessarily reflect the opinion or policy of this journal nor of the New York State Society of Industrial Medicine.

Editorial Board

B. J. Slater, M.D.
E. T. Wentworth, M.D.
M. S. Bloom, M.D.
A. R. Grant, M.D.
Raymond C. Almy, M.D.
Paul B. Jenkins, M.D.
Willis C. Templer, M.D.
Chas. P. Hutchins, M.D.
P. L. Forster, M.D.
A. M. Dickinson, M.D.
Chas. D. Squires, M.D.
Richard S. Farr, M.D.
C. W. Woodall, M.D.
Francis J. Ryan, M.D.
M. W. Stofer, M.D.
D. C. O'Connor, M.D.
F. N. C. Jerauld, M.D.
E. MacD. Stanton, M.D.
E. A. VanderVeer, M.D.
H. H. Baker, M.D.
R. E. Fenner, M.D.
O. A. Brenenstuhl, M.D.,
John L. Norris, M.D.,

Frank E. Redmond, *Managing Editor*
361 Delaware Ave., Buffalo, New York

The New York State Society of Industrial Medicine

Officers

E. A. Vander Veer, M.D.
President
Paul B. Jenkins, M.D.
1st Vice-President
A. R. Grant, M.D.
2nd Vice-President
Raymond C. Almy, M.D.
Treasurer
Frank E. Redmond, *Executive Secretary*

Directors

Dr. Raymond C. Almy, Auburn
Columbia Rope Co.
Dr. H. H. Baker, Rochester
423 Granite Bldg.
Dr. O. A. Brenenstuhl,
Albany
Dr. R. E. Fenner, Syracuse
433 S. Salina St.
Dr. Philip L. Forster, Albany
363 State St.
Dr. A. R. Grant, Utica
321 Genesee St.
Dr. Chas. D. Squires, Binghamton
28 Conklin Ave.
Dr. Willis C. Templer, Corning
Corning Glass Works
Dr. C. P. Hutchins, Syracuse
Aetna Life Insurance Company
Dr. Francis J. Ryan, Syracuse
New York State Railways
Dr. B. J. Slater, Rochester
Eastman Kodak Company
Dr. A. M. Dickinson, Albany
New York Central R. R.
Dr. Edw. T. Wentworth, Rochester
Dr. M. W. Stofer, Norwich
Norwich Pharmacal Company
Dr. M. S. Bloom, Binghamton
Dunn & McCarthy
Dr. E. MacD. Stanton, Schenectady
American Locomotive Company
Dr. F. N. C. Jerauld, Niagara Falls
Dr. Donald C. O'Connor, Buffalo
International Railways
American Radiator Co.
Dr. Richard S. Farr, Syracuse
Consulting Orthopedist
Dr. C. W. Woodall, Schenectady
146 Barrett St.
Dr. John L. Norris,
Rochester

1938 Annual Meeting at Albany, New York

OFFICERS

Chairman of the Board: Frank P. Hammond, M.D., F.A.C.S.
6308 Cottage Grove Ave., Chicago.

President: Kellogg Speed, M.D., F.A.C.S.,
122 South Michigan, Chicago.

Vice-President: Edward C. Holmblad, M.D., F.A.C.S.
28 East Jackson Blvd., Chicago.

Secretary-Treasurer: John D. Ellis, M.D., F.A.C.S.,
122 S. Michigan Ave., Chicago.

BOARD OF GOVERNORS

Harry E. Mock, M.D., F.A.C.S.,
R. A. Jacobson, M.D. W. F. Lyon, M.D.

millions spent upon the mechanical equipment. There are enormous amounts of useless records which, when they are finally analyzed, will have written on the cards of those who needed the help of medical treatment could have given: "blind," "maimed," "paretic," or "dead," for the lack of the specific medication that they should have received. The time will come, of course, when a blood test will be as much a routine procedure as vaccination against smallpox is today, but meantime the price of this neglect is costly.

We take the most obvious things casually. Thirty years ago the National Society for the Prevention of Blindness inaugurated a campaign for the control of ophthalmia neonatorum. The combined efforts of the American Medical Association, the ophthalmological and obstetrical societies, and the boards of health reduced the blindness resulting from this cause in the United States to less than 7%. The fact that it has increased to 9.1% shows that eternal vigilance is the price we pay for the preservation of sight.

What the Industrial Physician Has to Offer

OF ALL the forms of medical practice I believe this particular branch is the most fascinating.* Not only from the professional interest one finds in it, but also because it has a direct relationship to, and a bearing on the social and economic life of human beings to a greater degree than is found in any other branch of the practice of medicine. One bread-winner's neglected injury or illness, which could easily be doctored, often reduces a whole family to permanent dependence on charity.

From the social and economic point of view, the employee is a separate unit, and must be handled accordingly. Often a few hours delay in the beginning of treatment may mean infection, subsequent prolonged illness with a lot of permanent disability or even the loss of a life. The old open iodine bottle is fast disappearing from the first aid station in our large plants; the first aid man is being replaced by graduate nurses, on duty at all times.

The employer is responsible for, and is held accountable by law in the event of, any injuries arising out of and in the course of his employment, and in some states for occupational diseases. This has been made possible by the compensation law which was passed in Georgia in 1920.

The industrial surgeon's work has a direct bearing on his patient, his patient's family, as well as the company he works for. When his patient recovers from an injury, or as soon as maximum improvement has been reached, he must be dismissed and

* R. E. Newberry, M.D., Atlanta, Georgia, in *Fulton County Medical Society Bulletin*, April 21, 1938.

the company advised as well as the commission. The physician in giving a prognosis and estimating disability he must be unbiased, scientific, reasonable, and as accurate as possible, because the patient draws compensation and the company must maintain adequate funds to meet such liabilities. The surgeon, therefore, knows he must be interested in the case from a purely scientific point of view, for only then can all those concerned rely in confidence on his findings and opinions.

WE HAVE discovered by taking Wassermann tests on all injured employees that the presence of syphilis in these employees contributed to the sustaining of injuries through the slowness of the syphilitic individual mental reactions and faulty coordination between mind and muscle when engaged in the operation of some potentially dangerous piece of machinery. Clinically, all physical abnormalities were more frequent in persons who had syphilis.

Professionally, the industrial surgeon must not only have a thorough knowledge of medicine and surgery as it relates to industry, but also a well equipped office, modern in every respect, including an x-ray and fluoroscope, and an organization of assistants always on duty. This must be conducted as efficiently as the operating room in a good hospital. Accurate reports must be kept and records furnished promptly.

The physician is called upon to deal with the patients, the Industrial Commission, the industrial engineers, the insurance carriers and their claim men. Thus, in addition to actual professional knowledge he must have contact with and a knowledge of medico-engineering, and socio-economic problems.

The industrial surgeon because of experience in this field is indeed expert in evaluating injuries in terms of mathematical or monetary loss.

The regular forms for physical examination call for a thorough check up. They do not all receive a Wassermann test unless there is some evidence of history of venereal infection. Only those cases with malignant hypertension, nervous instability, recent hyperthyroidism, acute infectious diseases, rheumatic fever, recurrent tonsilitis or signs of beginning decompensation are rejected. Eye defects are corrected. Inguinal hernia is a very pressing problem in heavy industry today and is costing large sums of money. All patients with a frank hernia, that is one which is easily felt with the finger in the external ring, or which may come through and be a complete hernia, are advised to have an operation for correction before given employment. Those with large rings or potential hernias may do light work or office work.

Meetings are being held often to study and discuss problems peculiar to practice, promote the art and

The Association for the Advancement of Industrial Medicine and Surgery
Inc.

Executive Office - 370 Lexington Avenue, N. Y. (Room 904)

PURPOSE: *To disseminate accurate medical knowledge in reference to the diagnosis and treatment of all conditions arising out of and in the course of employment.*

OFFICERS

President:
J. J. WITTMER, M.D.
4 Irving Place,
New York City

Recording Secretary:
HALCYON HALSTEAD, M.D.,
528 Stellar Ave.,
Pelham Manor, N.Y.

Vice-President:
FRED H. ALBEE, M.D., F.A.C.S.
57 West 57th St.,
New York City

Treasurer:
JOSEPH L. RAMIREZ, M.D.
30 Fifth Ave.,
New York City

Executive Secretary:
J. J. BLACKFORD, 370 Lexington Ave., New York City
(CAledonia 5-9753)
Robert F. Coleman, Inc.

EXECUTIVE COUNCIL

DR. J. HUDSON BLAUVELT.....Fidelity & Casualty Insurance Co.
DR. T. WALLIS DAVIS.....Borden Company
DR. LYLE ELLIS.....Travelers Insurance Co.
DR. HALCYON HALSTEAD.....Globe Insurance Co.
DR. BURKE C. HAMILTON.....Aetna Life Insurance Co.
DR. GEORGE A. KOENIG.....National Biscuit Co.
DR. WILLIS W. LASHER.....Employers Liability Assurance Co.
DR. FREDERICK L. MOSSER.....Third Ave. Ry. & Bus Lines
DR. ARTHUR R. TILTON.....Travelers Insurance Co.

The Pneumonokonioses Series

Geo. G. Davis, M.D., F.A.C.S., E. M. Salmonsen, and J. L. Earlywine.

I—The Pneumonokonioses (Silicosis)
Bibliography and Laws

II—The Pneumonokonioses (Silicosis)
Literature and Laws of 1934

III—The Pneumonokonioses (Silicosis)
Literature and Laws (1935-1936 and 1937 Current)

All three in uniform cloth binding, 6x9. Prices as follows:

Book III .....$ 8.50
Book II .....$ 7.50
Book I .....$ 7.50
Any Combination of 2 Books.....$15.00
All—Books I, II and III.....$20.00

INDUSTRIAL MEDICINE
540 North Michigan Avenue, Chicago

Central States Society of Industrial Medicine and Surgery

Component Society of the American Association of Industrial Physicians and Surgeons

1937-38 OFFICERS

PRESIDENT ..... DR. FREDERICK W. SLOBE..2024 S. Western Ave Chicago
VICE-PRESIDENT ..... DR. DON DEAL.....First National Bank Bldg., Springfield, Ill.
SECRETARY-TREASURER.. DR. FRANK P. HAMMOND....6308 Cottage Grove Ave., Chicago

BOARD OF GOVERNORS

1938
DR. JAMES H. FINCH.....Champaign, Ill.
DR. F. J. OTIS.....Moline, Ill.
DR. RALPH M. CARTER.....Green Bay, Wis.

1939
DR. GEORGE L. APFELBACH....645 Fullerton Pkwy., Chicago
DR. ROBERT L. KERRIGAN.....Michigan City, Ind.
DR. WILLIAM C. GOENNE.....Davenport, Iowa

1940
DR. GEORGE W. STABEN.....Springfield, Ill.
DR. HAROLD A. VONACHEN.....Peoria, Ill.
DR. W. M. HARTMAN.....Macomb, Ill.

Chicago Society of Industrial Medicine and Surgery

1937-38 OFFICERS

PRESIDENT ..... DR. FRED G. CARLS.....5607 Roosevelt Road, Chicago.
VICE-PRESIDENT ..... DR. GENE BURROWS.....2301 S. State St., Chicago.
SECRETARY-TREASURER.. DR. FRANK P. HAMMOND....6308 Cottage Grove Ave., Chicago.

BOARD OF GOVERNORS

1938
DR. O. WALTER REST.....4157 S. Halsted St., Chicago.
DR. FREDERICK W. SLOBE....2024 S. Western Ave., Chicago.
DR. EDGAR A. DEGENHARDT....4805 Fullerton Ave., Chicago.

1939
DR. JOHN G. FROST.....718 E. 63rd St., Chicago.
DR. FELIX M. JANSEY.....30 N. Michigan Ave., Chicago.
DR. CLARENCE W. HENNAN.....841 E. 63rd St., Chicago.

1940
DR. FRED M. MILLER.....2136 Indiana Ave., Chicago.
DR. JAMES A. VALENTINE.....1608 W. 22nd St., Chicago.
DR. EMILE C. DUVAL.....105 W. Madison St., Chicago.

Michigan Association of Industrial Physicians and Surgeons

Officers

PRESIDENT ..... A. H. WHITTAKER, M.D., F.A.C.S. Detroit
VICE-PRESIDENT ..... LEON SEVEY, M.D. Grand Rapids
SECRETARY-TREASURER ..... DON F. KUDNER, M.D., F.A.C.S. Jackson

Board of Directors

L. H. CHILDS, M.D. ..... Flint
CARL E. BADGELY, M.D., F.A.C.S. ..... Ann Arbor
HENRY J. PYLE, M.D. ..... Grand Rapids

science of medicine, to develop methods for conservation of health among workers in industry, to promote more general understanding of the purposes of treatment and results of medical care of injured and sick employees.

Repairing the Unemployed

IT WOULD seem fairly obvious, if one stops to think about it, that many people are unemployed because they have some physical disability which prevents them from working at the only job for which they have prepared themselves, and, further, that if they could be given adequate and intelligent medical attention these disabilities could be removed.*

Our politicians have, however, been so busy exploiting the possibilities of vote-buying which our present American dole system provides for them, that little or no thinking has been done about the matter until West Virginia, under the stimulus of Dr. J. W. Savage, secretary of the State Medical Association, with the help of C. W. Ritter, of the State Compensation Department, conducted some experiments and made some discoveries.

It was found that out of 18,000 unemployed who were examined, 7,800 (nearly half) needed some kind of medical attention; and that the average cost of putting these human derelicts in working order (the physicians agreed to cut their ordinary fees in two) would be $120, while the average cost of their "relief" was $230 a year. Since this showed a paper profit to the State, the relief officials dubiously and grudgingly agreed to let the agitators have $1,000 to try out their plan.

Ten unemployed men were selected for the experiment, and when they were all fixed up, nine of them promptly found paying jobs, so that they went off the "relief" lists. The State saved the cost of this repair work in the first five months, and thereafter the saving was all "velvet." The physicians who did the work received at least some money for their efforts. The "guinea pigs" were delighted.

After some more experimenting, with the cordial cooperation of the State Medical Association and with comparable results, the upshot is that the newly organized Physical Rehabilitation Department is now receiving a grant of $50,000 a month for its work, and if matters continue as they have been going so far, and only 60% of the mended ones find private jobs promptly (which, based upon results up to now, is a truly conservative figure), the state will have a clear profit, at the end of the *first year*, of $90,000.

If the officials of any State Medical Society sometimes wonder what

---

* Editorial, *Clinical Medicine and Surgery*, February, 1938.

they are for (besides personal politics), here seems to be a worthy piece of work for them to tackle—a job which will be a real public benefit and increase their prestige, at no cost to themselves except the expenditure of a moderate amount of energy, time, and thought. The West Virginia brethren will probably be glad to give details of their accomplishment to any who yearn to do a piece of real, constructive pioneering, for the sake of themselves, their professional confreres, and the people in general.

If the leaders seem indisposed to undertake this work, it will be up to the members who approve of it to put a burr under their saddles or to get a set of officials who have more public spirit.

Medicolegal Aspects of Fractures

IN DIAGNOSING and reducing and treating fractures, the following suggestions will be helpful to you in the event of a malpractice suit, even though some of them may seem unnecessary from the viewpoint of the physician, and may be calling for a higher degree of care than required by law:*

1. If there is the slightest reason to suspect a fracture, at the site of a visible injury or elsewhere, make a thorough x-ray examination.

(a) If x-ray apparatus is not available in your community, or if the patient refuses to authorize x-ray examination, be sure to advise the patient in the presence of reliable witnesses that you advise the use of x-ray, and that you will not be responsible for any error of diagnosis or treatment which could have been prevented by the use of x-ray or fluoroscope.

2. If you are not skilled in interpreting x-ray pictures, do not hesitate to get competent help. Even if you are skilled in interpreting x-ray pictures or in reducing fractures, it is advisable to have one or more competent physicians in all cases where bad results might follow to examine the x-ray pictures and to confirm your diagnosis, and to verify the diagnosis and the position of the bones after reduction.

3. In cases of severe fractures where bad results are likely to follow, even at the hands of the most skillful, do not undertake to handle the case unless you are an expert in that line, without first recommending to the patient that he consult such an expert, and if he refuses, inform him before you accept employment that you recommend that he consult an expert and that you do not undertake to use any more care or skill than the average physician practicing in the same line of work as yours uses and possesses.

4. If a patient should enter a hospital in order to receive proper diagnosis and treatment and refuses to do so, inform him in the presence of reliable witnesses that you will not be responsible for any bad results which could have been prevented had the patient entered a hospital.

5. Check your diagnosis carefully. Consider every symptom and every detail of the history and be sure to use every diagnostic aid available, and if you have the slightest doubt as to whether or not your diagnosis is correct, do not hesitate to consult another doctor whom you consider as able or abler than you to confirm your diagnosis.

6. Keep good office records of the case and preserve them.

---

* GROVER MIDDLEBROOKS, Atty., Atlanta, Ga.; *J. Med. A., Georgia*, January, 1938; quoted in *Ohio State M. J.*, March, 1938.

Relation of Trauma to Hernia

IRA N. KEARNS, M.D.,
Louisville, Kentucky

THE question of the relation of traumatism to hernia is one that has been discussed pro and con for many years.* Formerly there were the inguinal, umbilical and femoral types, which were thought by the profession to be traumatic, but were later disproved. Apparently the indirect inguinal hernia is the only one left, over which there is considerable discussion, not so much at the hands of the profession, but from the laity and the various state industrial boards, in their administration of the hernia question.

When we stop to consider the anatomical factors responsible for an indirect inguinal hernia, we must take into consideration the anatomical factors, starting from the development of the fetus in utero; we are told

* Read before the Jefferson County Medical Society; published in *Kentucky Medical Journal*, April, 1938.

LITERARY MEDICAL RESEARCH
in all its Branches
BIBLIOGRAPHIES -- ABSTRACTS
in English and all Foreign Languages
Expert Services Reasonable Fees
Address
LIBRARIAN
c/o INDUSTRIAL MEDICINE
540 North Michigan Avenue Chicago, Illinois

Behind Mercurochrome
(dibrom-oxymercuri-fluorescein-sodium)
H.W.&D.
is a background of

Precise manufacturing methods insuring uniformity
Controlled laboratory investigation
Chemical and biological control of each lot produced
Extensive clinical application
Thirteen years' acceptance by the Council of Pharmacy and Chemistry of the American Medical Association

A booklet summarizing the important reports on Mercurochrome and describing its various uses will be sent on request.

HYNSON, WESTCOTT & DUNNING, Inc., Baltimore

about the fourth month, when sex is determined, the testicle descends into the scrotum through the inguinal canal; if there is normal closure of the rings and normal development of muscular structure de do not have indirect hernias, but with poorly developed muscular structures and abnormally large inguinal rings, we have here the beginning of a formation of potentially pre-existing hernial sac of some proportions, which at some future time may become herniated through the inguinal canal, when there is sufficiently increased abdominal pressure from within to set the hernial sac in motion.

Section 4a. of the Kentucky Workmen's Compensation Law states: "In all claims for hernia resulting from injury received in the course of, and resulting from the employee's employment it must be definitely proved to the satisfaction of the board:

"First: That there was an injury resulting in hernia.

"Second: That the hernia appeared suddenly and immediately following the injury.

"Third: That the hernia did not exist in any degree prior to the injury for which compensation is claimed."

These stipulations are the specifications for direct hernia which were laid down by one of our surgical congresses, but the Kentucky Act is very broad in its application and makes indirect inguinal hernia compensable as a result of trauma. The state of Virginia applies the law with reference to indirect inguinal hernia more broadly than the State of Kentucky while the State of Pennsylvania and the State of Indiana recognize indirect inquinal hernia only as a pre-existing condition, and it is not compensable, although there is a liability in the Indiana Act for service to an employee with a strangulated indirect inguinal hernia, as a life saving measure. The United States Government recognizes indirect inguinal hernia as an aggravation to an already pre-existing condition; under public liability, the individual has his rights in court as an aggravation of a pre-existing condition.

So much for indirect inguinal hernia. As to the direct hernia, the causative factors can all be grouped under the head of increased intra-abdominal strain or pressure, as in any occupation calling for effort, causing the abdominal contents to be forced downward and forward. This takes into consideration persons who are doing heavy work as a rule.

It is rather obvious that when we have taken into consideration the question of the anatomical formation of pre-existing factors in hernia, there is very little left in the hernia field which is not a pre-existing condition; it is true we all see cases of epigastric hernias, which are often classed as traumatic, althought after all it is only an aggravation of already weakened structure, the same thing applying to the umbilical group, also the ventral hernia following operation and the others as well, and while we have these facts in mind, we must take every case until itself where there is a possibility of direct herniation.

THE relationship of traumatism to hernia by means of actual force to the individual working in industry as a direct cause is a neglig ble factor on account of pre-existing potentialities.

2. There are some cases of direct hernia which have merit and these particular cases should be weighed upon their own merits by the surgeon before giving his opinion.

3. It is very obvious that many court decisions on hernia, as in many other medicolegal cases, are at variance with the true medical facts.

From the Archives

PROGRESS in organization is much behind that made in scientific development in modern scientific medicine.* Thus coordinating agencies are sorely needed; and there is no more important problem in modern medicine than this particular deficiency. There is an especial need for official agencies to develop the idea of preventive medicine in industry to its fullest extent. This principle seemingly is not feasible in private medical practice because physicians have apparently not been successful in developing a demand for preventive methods in private work. Official agencies can take the initiative because they are not in the position of a physician endeavoring to increase his personal following. Perhaps the great weakness in private practice is not realizing that prevention is more important than cure. Industrial workmen are constantly searching for a guarantee against the occurrence of three unfortunate circumstances — sickness, unemployment and death. Perhaps sickness is the greatest of all these problems; certainly it may cause the other two, it occurs in greater amount, it costs more, and its effects are more disabling. The private medical practitioner is in a very peculiar economic position—he exacts money from his patients during the period when there is no income. The proper types of service in industry can meet this situation. But the industries must have a common ground of reference and consultation."

* C. O. SAPPINGTON, M.D., DR.P.H.; a personal communication in 1928.

Medicolegal Aspects of Alcoholism

HAROLD W. MORGAN, M.D.,
Mason, City, Iowa

IN THE days of the horse and buggy it was probably reasonably safe for an individual to take a drink or even several drinks and still be on the highway, but with the advent of the automobile, many changes in our ways of living have come about.* During the prohibition era we thought the problem would be solved and that we would have no drunken drivers, but this was not the case. Then we were told that if prohibition was repealed and men were allowed free access to intoxicating liquors, the problem would again be solved. However, this seems to have failed to bring the correct solution to the problem, and we are faced today with the necessity of dealing with the drunken driver. With the increased number of cars on the road and the increased power and speed of automobiles, some adequate control of the traffic problem is being sought.

The question of the percentage of accidents caused by drinking drivers is an open one. One can find figures to show that alcohol is involved in less than one per cent of the accidents, and other individuals would have you believe that all accidents are directly traceable to liquor in some form or another on the part of one or both drivers. As is usually the case in such controversies the truth lies somewhere between the two extremes. Heise[1], of Milwaukee, to whom I am indebted for the work on this test, recently investigated a series of fifty consecutive automobile accidents. In this series, alcohol was involved in 32 cases and no alcohol in 18. In the 32 alcohol accidents 71 were injured and four were killed. In the no alcohol cases 23 were injured and none was killed. The coroner in Cleveland, Ohio, recently reported his investigations on a series of over 300 fatal accidents. He found that alcohol was involved in 55%.

Doctors are usually drawn into the controversy in an effort to determine whether or not some particular individual was or was not drunk, and they are often asked to determine the extent of intoxication in certain cases. Almost all of us have had the experience of examining intoxicated individuals and most of us will agree that under ordinary circumstances there is no great difficulty involved in arriving at a decision in regard to these questions. There are instances where an individual may be suddenly sobered by an accident. There are also instances where concussion or some other disease process may be mistakenly called intoxication. We have all of us had experience at one time or another on the witness stand where lawyers have cross-examined us as to the condition of a patient accused

* In *Journal of Iowa State Medical Society*, April, 1938.

of being intoxicated. In Mason City it is very difficult to get a physician to swear on the witness stand as to the condition of such a patient. Legally it is almost impossible, without laboratory aid, to make an unquestioned statement as to a person's condition or the amount of alcohol which he has consumed.

About two years ago I became interested in this problem from a laboratory standpoint and since that time have experimented with several methods of determining the extent of intoxication by examinations of the blood and urine of patients. Several procedures have been tried in different laboratories and I have worked with each of them in turn to determine the simplest and most reliable. The first such tests were conducted by Nicloux in France and a great deal of work has been done on the Continent to make these tests available in police courts. The tests are all based upon the principle that in strongly acid media, alcohol gives a color reaction which is directly proportional to the amount of alcohol present.

Technic of Test

DISTILL a mixture of 10 cc. of urine with about 10 cc. of half saturated picric acid containing about 10% tartaric acid, collecting the first 10 cc. of the distillate, and mix. In separate tubes similar to those used for the standards, place 1 cc. in one, and smaller measured amounts in the others, making the volume up to 1 cc. in each case. Add 3 cc. of the $K_2C_2O_7$ reagent to each tube, and place in boiling water bath for four minutes. Compare colors with those of the standard scale. Divide the reading by the fraction of a cubic centimeter of distillate used, which gives the percentage of alcohol by weight. The use of several tubes permits a close checking of the results and gives greater opportunity for having readings on the scale. If the results are too low to be read, use the weak standards; using 2 cc. of the distillate and known smaller amounts, bringing the volume to 2 cc. in each case.

Add 1 cc. of the reagent and place tubes in boiling water for 12 minutes. If blood is being tested take 2 cc. of whole blood, plasma, or serum (all give the same results), add about 15 cc. of the picric-tartaric reagent, and collect the first 10 cc. of the distillate. This is tested on the weak standard scale and the result multiplied by five.[2] The $K_2C_2O_7$ reagent is 0.33% $K_2C_2O_7$ in 50% H_2SO_4. The test is extremely accurate.[3] Two technicians can consistently check results within one hundredth of a per cent when the strong standards are used, and within two one thousandths of a per cent when the weak standards are used. There are other substances which will reduce potassium dichromate, giving a color reaction similar to that derived from alcohol. However, all of these substances, such as chloroform, ether, chloral hydrate, salicylate and acetone are eliminated in the process of distillation.

In interpreting the test, the level at which legal intoxication is said to be present has been fixed by almost all authors at 200 milligrams, or near that figure. A few individuals will show clinical intoxication at 150 milligrams of alcohol per 10 cc. of blood, and an occasional individual may not show all the clinical signs at 200 milligrams. Heise in his article places the figure at 190 milligrams. Bogen[4] in 1928, found that a concentration of 100 milligrams per 100 cc. of urine indicated a condition called decent and decorous; 200 milligrams per 100 cc., distinctly drunk; 300 milligrams per 100 cc., drunk and disorderly; and 400 milligrams per 100 cc., meters, dead drunk. In 1930, Johnson,[5] of the Naval Hospital in New York, confirmed these findings.

The normal rate of elimination for alcohol is 10 to 20 milligrams per hour. By taking two tests one hour or more apart, the rate for the individual may be determined, and his condition at a previous time may be calculated, provided he has taken no alcohol in the interval. This is valuable in dealing with hit and run drivers.

IT IS not necessary for an individual to be intoxicated in the legal sense of the word for him to be a menace on the highway. Small amounts of alcohol have a definite effect upon the driver's reaction time and upon his ability to meet unusual situations. With as little as 20 milligrams per 100 cc. of blood, reaction time is definitely prolonged. With 100 milligrams per 100 cc. the reaction time is increased by about 60% above normal for that individual. I personally believe anyone with over 100 milligrams per 100 cc. of blood should not be driving a car. There is no tolerance developed for alcohol in the sense of an increased tolerance to drugs such as morphine. It is true that one individual can take large amounts of alcohol without becoming intoxicated, while others can take very much smaller amounts and immediately become intoxicated. Two factors are involved in this consideration: An individual who is accustomed to taking large amounts of alcohol holds the alcohol in his gastro-intestinal tract for much longer periods of time than one who is not used to it. In other words, it is absorbed much more slowly into the blood of the habitual drinker than it is in the one not used to alcohol. Physiologically, alcohol in the stomach is still outside of the body. An individual used to alcohol can also destroy it at a rate approximately one-third faster than the individual not used to it, after it has been absorbed in the blood. It will therefore take larger amounts of alcohol or longer periods of time or both, for habitual users to reach the same level of intoxication which might be reached by another individual in a much shorter period of time. When the

WEAK PERMANENT STANDARDS

Color Standards containing per cent alcohol by weight	Prepared by Using	Alcohol by weight	With Water cc.
0.005	1.0 cc. of 0.01 per cent	"	2.0
0.010	2.0 cc. of 0.01 per cent	"	1.0
0.013	0.52 cc. of 0.05 per cent	"	0.0
0.016	0.64 cc. of 0.05 per cent	"	1.48
0.019	0.76 cc. of 0.05 per cent	"	1.36
0.022	0.88 cc. of 0.05 per cent	"	1.24
0.025	1.00 cc. of 0.05 per cent	"	1.12
0.028	1.12 cc. of 0.05 per cent	"	1.00
0.031	1.24 cc. of 0.05 per cent	"	0.88
0.034	1.36 cc. of 0.05 per cent	"	0.76
0.037	1.48 cc. of 0.05 per cent	"	0.64
0.040	1.60 cc. of 0.05 per cent	"	0.52
			0.40

Add 1 cc. $K_2C_2O_7$ reagent to each tube. Place tubes in boiling water bath 12 minutes.

STRONG PERMANENT STANDARDS

Color Standards containing per cent alcohol by weight	Prepared by Using	Alcohol by weight	With Water cc.
0.0			1.00
0.05	0.50 cc. of 0.10 per cent	"	0.50
0.10	1.00 cc. of 0.10 per cent	"	0.0
0.12	0.60 cc. of 0.20 per cent	"	0.40
0.14	0.70 cc. of 0.20 per cent	"	0.30
0.16	0.80 cc. of 0.20 per cent	"	0.20
0.18	0.90 cc. of 0.20 per cent	"	0.10
0.20	1.00 cc. of 0.20 per cent	"	
0.22	0.73 cc. of 0.30 per cent	"	0.27

To each tube add 3 cc. N/15 $K_2C_2O_7$ (0.33% in 50% H_2SO_4). Place tubes in boiling water four minutes and seal.

two individuals reach the same level they will be equally intoxicated.

The legal status of the test in Iowa has not been completely determined as yet. Evidence derived from such tests has been admitted in some of our district courts. So far, all tests admitted have been taken voluntarily. There is some legal opinion that compulsory tests should also be admitted.[6] If a physician takes the blood or urine for a test, he must be careful to avoid any action or treatment which might be construed to form a privileged relationship between the physician and the accused. The specimen must be carefully guarded and must be transported between the point of taking and the laboratory where it is examined so that there can be no question of tampering with the specimen. The following results from using these tests are of interest:

Name	Alcohol Content per 100 cc.	Body Fluid	Result of Case
1. O.E.S.	205 mgs.	Urine	Plead guilty to a lesser charge.
2. O.T.	206 mgs.	Blood	First test case. Convicted.
3. J.W.	196 mgs.	Blood	Plead guilty.
4. O.W.	204 mgs.	Blood	Plead guilty.
	220 mgs.	Urine	
5. O.S.M.	160 mgs.	Urine	Plead guilty.
6. A.J.	0 mgs.	Urine	Freed.
7. C.R.C.	410 mgs.	Urine	Found guilty.
8. C.L.	252 mgs.	Urine	Found guilty.
9. D.C.	212 mgs.	Urine	Found guilty.
10. H.L.	270 mgs.	Urine	Found guilty.
11. H.I.	300 mgs.	Urine	Plead guilty.
12. C.O.	190 mgs.	Blood	Plead guilty.

In Case 1, the evidence of the test was admitted by Judge Graven, and after its admission, a plea of guilty was accepted. Since the trial was not finished, the opinion of Judge Graven was not widely published. Case 2 was freed on a manslaughter charge, then convicted of driving while intoxicated, with blood test the only additional evidence. Cases 3 and 4 had "split the bottle." Notice the even distribution of the alcohol. Case 6 was held for driving while intoxicated, but was freed after the test showed no alcohol, thus proving that the test is absolute protection for one who has been falsely accused. Case 7, with the largest amount of alcohol in my series, was reported by the town marshall to be "the drunkest man I ever saw." Mr. Daly, county attorney of Hancock county, reported to me in a personal communication that he had secured convictions in every case where he had used the test.

Summary:

THERE is available a scientific test by which we can determine the exact state of intoxication of any individual. The test is simple, accurate and specific for alcohol. It has been accepted by some of our Iowa courts. Its more general use would bring about more convictions in cases of intoxication while driving a motor.

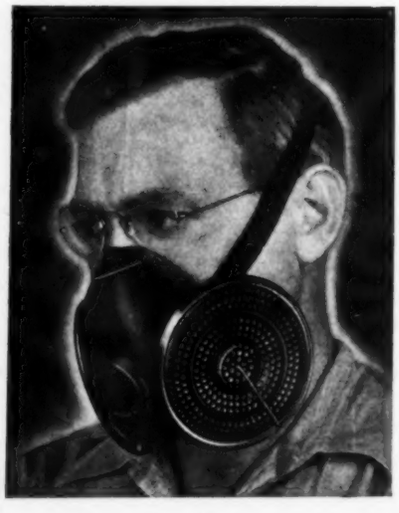
References:

1. HEISE, H. A.: Alcohol and automobile accidents. *J.A.M.A.*, ciii: 739-741 (September 8) 1934.
2. HEISE, H. A.: Specificity of test for alcohol in body fluids. *Am. J. Clin. Path.*, iv: 182-188 (March) 1934.
3. HEISE, H. A.: *Ibid.*
4. BOGEN, E.: Drunkenness; quantitative study of acute alcoholic intoxication. *J.A.M.A.*, lxxxix: 1508-1511 (October 29) 1927.
5. SIMMONS, J. A.: Determination of alcohol in blood or urine. Laboratory Methods of United States Army, pp. 507-510.
6. Use of scientific tests to determine intoxication. *Iowa Law Review*, xxiii: 57-67 (November) 1937.

A complete bibliography on this subject will be found in the author's reprints.

New Dust Respirator

A NEW dual-disc respirator for protection against Type A, or nuisance dusts, which employs unusually inexpensive throw-away filters, has just been developed in the industrial hygiene laboratory of Willson Products, Inc., 209 Thorn St., Reading, Pa. This respirator, designated as No. 750, bears Approval No. 2119 of the United States Bureau of Mines and is the eighth Willson respirator to be officially approved by the Federal Government.



Willson "750" Respirator

Inexpensive filters are essential in many occupations, particularly wet operations. Inasmuch as only one filter is needed for each holder, and either side of the filter may face outwardly, the wearer has no difficulty in making filter changes when needed and has assured protection. The dual-disc filters provide 28 square inches of filtering surface, offering the advantage of very little resistance to breathing.

The manufacturer will be pleased to furnish complete information and prices upon request.

Carbon Monoxide in Motors

THE industrial hygiene service of the state department of public health, of California, in cooperation with the state highway patrol, has been conducting tests on motor vehicles to determine the amount of carbon monoxide to which drivers are exposed.[1] Of 688 drivers tested in the preceding month, according to the bulletin of the state department of health, February 26, the drivers of 24 vehicles, or 3.47%, were found to have been exposed to dangerous concentrations of carbon monoxide while operating vehicles on the highway. The investigations are being conducted by Dr. John P. Russell, Berkeley. A patrolman signals the driver to stop and the physician then accompanies him for a five-minute run, testing the floor board of the truck with special instruments.

Order Relative to Hernia

AN ORDER to the effect that no treatment of hernia by the injection method is authorized and that such treatment will not be paid for was recently issued by the United States Employees' Compensation Commission.[2] This Commission is in charge of compensation and payment for medical services rendered to injured W.P.A. workmen.

Legal Aspects of Traumatic Neurasthenia

TRAUMATIC neurasthenia is, by its very nature, a legal problem as well as a medical one.[3] If the doctor be called in by a corporation, it is assumed that he will negative the injury if possible, or at least minimize

1. *Ohio State Medical Journal*, May, 1938.
2. *J.A.M.A.*, April 23, 1938.
3. JOHN E. LIND, M.D., Washington, D. C., in *Clinical Medicine and Surgery*, April, 1938, quoted from *Medical Record*.

it as much as possible; and if called in by the litigant's lawyer, he is expected to find as much wrong with the patient as he conveniently can. In order to avoid embarrassment and suspicion, the physician would do well to adopt this line of conduct:

Before making any examination of the case whatever, or expressing even a tentative opinion, he should quote his fee to the lawyer for the examination with opinion. This should preferably be paid in advance, but in any even should never be dependent on the outcome of the case. It is extremely embarrassing, in court, to be obliged to confess, on cross-examination, that the size of one's fee depends on how large an amount the litigant collects. The inference that one is interested in making out an extensive injury is hardly to be avoided.

HAVING made a definite financial arrangement, the careful examination of the patient is next in order. If you decide the patient is malingering or grossly exaggerating his symptoms, two courses are open to you: If you are examining him on behalf of some corporation, society, or union, you may endeavor to get the patient to take a more responsible attitude. Nothing is gained a rule, especially in civilian life, by telling him abruptly that he is a fake. It is far better to let him down easy—let him see that you are not to be deceived and, if his dissimulation be due to ignorance or suggestibility, it may be possible to get him to admit that he had unconsciously exaggerated his injuries. If, on the other hand, you find that you are dealing with a man actuated by the desire for revenge or strong self-interest, it is a waste of breath to argue with him. Draw up your report and forward it to the corporation, avoiding dogmatic statements and contenting yourself with pointing out the discrepancies and inconsistencies in the patient's actual symptoms, as compared with his claims. If you are employed by the patient's lawyer, it is usually well to have an interview with him, pointing out the exaggeration or unreality of his client's claims. You can then collect your fee and drop gracefully out of the case.

On the other hand, if you find traumatic neurasthenia to be actually present, whether you are employed by a corporation or not, you should draw up an account of your findings and turn it in. If you are employed by the litigant's counsel, you must be prepared to back up your diagnosis in court under the barrage of an extremely efficient lawyer.

This brings us to the question of the physician's attitude in court in out of these cases. *He can hardly go too well fortified.* He must be prepared for all sorts of objections to his testimony. In the first place, supposing that he represents the litigant, the opposing lawyer will probably ask him whether or not he treated the patient. If he replies, "No," the lawyer may try to rule out his testimony on the ground that he is not a competent witness, as he did not see the patient in a purely professional manner, but only for the purposes of litigation. This contention will probably not be upheld, however.

The doctor begins a description of the patient's symptoms, describing first the subjective ones. The opposing lawyer then objects to these as being hearsay evidence. Sometimes he is successful in having them ruled out, but they may be admitted as being part of the evidence on which the physician's diagnosis is based. Supposing the subjective symptoms are admitted, the doctor then proceeds to tell how the patient has been apprehensive, excitable, easily fatigued, etc. The opposing lawyer will then object that these symptoms were all in the past and not necessarily present when the patient was examined, and the judge may sustain this objection. Naturally this means ruling out a large part of the subjective symptoms, and indeed, in many cases, they are all ruled out. If the physician then has not fortified himself on the objective symptoms of the disorder, he will feel as if the ground were cut from under his feet. He must also bear in mind the tests for malingering, as the opposing lawyer is quite likely to ask him how he knows the symptoms in question were real. In his cross-examination, too, he may be asked what effect litigation has on this condition and the probable effect of a large cash payment. His reply to this is that anything which increases the patient's worry and anxiety will aggravate the condition, such as subjecting him to needless delay in the settlement of a just claim.

There is no doubt that the condition of traumatic neurasthenia is aggravated during a long, tedious litigation, perhaps the patient has no independent income, and being incapacitated for work, his debts mount up. It follows then that a generous verdict relieves financial anxiety and has a very favorable effect on his condition.

A Critical Review of Workmen's Compensation Laws

THEODORE C. WATERS,
Mullikin, Stockbridge & Waters, Baltimore

DURING the past year occupational disease amendments to existing Workmen's Compensation Laws have been enacted by the States of Delaware, Indiana, Michigan, Pennsylvania, Ohio and Washington.* Therefore, today there are 21 states whose laws now provide compensation for occupational diseases. In the following states Commissions have been appointed for the purpose of studying and recommending compensation legislation:

Alabama, Arizona, Georgia, Kansas, Maine, Maryland, New Mexico and Oregon.

It is apparent that a new emphasis has been placed upon the need for compensating occupational disease injuries, and in the course of the next few years all of the industrial states will have probably enacted laws for this purpose.

In choosing three of the subjects discussed in the new bulletin, I do not mean to minimize the importance of the other subjects treated therein. However, in view of the present trends of occupational disease legislation, the following subjects are of special interest at this time:

(a) Provisions compensating partial and total disability from silicosis.

(b) Limitation provisions.

(c) Provisions dealing with preemployment and periodic post-employment physical examinations of employees.

* In *Safety Engineering*, February, 1938.

Disability from Silicosis

OCCUPATIONAL disease laws generally award compensation for partial and total disability in the same manner and under schedules similar to those for disabilities caused by accidents. In several of the laws recently enacted, compensation for partial disability caused by silicosis has been denied.

The basic theory of the Workmen's Compensation Acts is to provide compensation solely for disability, and the legislatures of certain of the states have come to recognize that many employees who have some presently determinable evidence of silicosis are engaged in trade, not knowing of the existence of the disease in them, showing no noticeable disability, and fully capable of performing their regular duties. Precedent for the denial of compensation for partial disability was established by the method of awarding compensation for silicosis in South Africa, where medical classification of the stages of the disease were provided in the law.

In the first stage (ante-primary) relatively low compensation was payable so that the employee would be compensated for the time that might elapse from the date of his removal from his hazardous employment until he could find employment in some other trade.

The West Virginia law follows this idea and defines three stages of the disease, providing compensation in

the amounts of $500 and $1000 respectively for the first and second stages of the disease, with full compensation in the same manner and at the same rate as is provided for permanent disability or death from accidental injuries when the claimant is suffering from the disease in the third stage. During 1936, New York State amended its occupational disease compensation statute to deny compensation for partial disability due to silicosis or other dust diseases, while during 1937, Ohio, Pennsylvania, and Michigan passed laws denying compensation for partial disability from the dust diseases.

Importance of Diagnosis

IN MANY instances employees have been advised by physicians, untrained and inexperienced in the diagnosis and eect of silicosis, that they have the disease and thereby have sustained disability. Acting on this advice, the employee, now concerned about his condition, leaves his employment, even though that trade may be the only one in which he is able to earn a living. He may then find himself unacceptable for employment elsewhere and becomes unable to earn a living wage, with resulting hardships to himself, his family and eventually to his community, which might have been avoided had he been properly advised that he had suffered no actual disability and that the risk of continuing in his employment was negligible. Employers likewise suffer from improper diagnosis, with the resulting persecution of common law suits or unjustified compensation claims. Not only is this litigation excessively expensive, but it may have a far reaching detrimental effect upon the entire employer-employee relationship, tending to destroy public confidence in an industry which may, as a matter of fact, be well managed, properly equipped and operated with full consideration for the health of its employees.

There are persuasive reasons both for and against legislative provisions denying compensation for partial disability from silicosis, but until an approved method is devised for the purpose of evaluating such disability, the denial of compensation for partial disability is not only equitable, but desirable.

Total Disability Problem

WITH respect to total disability, the problem is much simpler. When the disease is accompanied by active pulmonary tuberculosis, the employee should be removed from the hazard of dust, not only for his own protection, but for that of his fellow workmen, in order to remove them from the possibility of infection. An employee so injured should receive the full total disability benefits of the law. Adequate protection should be afforded to employers to determine the actual cause of disability so that compensation may not be awarded unless the claimant is determined by competent medical examination to be suffering total disability. Pre-employment examinations will enable employers to avoid the employment of tuberculars and tubercular suspects in industries wherein silica is a hazard, and by this method they may relieve themselves from a considerable portion of the potential total disability benefits that may be awarded under our compensation statutes.

Limitation Provisions

ONE subject that has not received merited attention is the period of limitations after exposure or injury within which formal proof of claim for compensation must be filed. Our state laws vary widely with respect to this problem, but generally speaking they relate to:

(a) A period of employment within the state as a prerequisite to the filing of claim for compensation and/or

(b) The time within which claims for compensation must be filed after injury or the termination of employment.

The following states require exposure in employments within the state as a prerequisite to the right to file claims:

Illinois—60 days' exposure (all diseases).

Indiana — 60 days' exposure (all diseases).

North Carolina — two years' exposure (silicosis and asbestosis).

Ohio—five years' exposure to silica dust; for other diseases, employee must be resident for 90 days.

Pennsylvania—two years' exposure (silicosis and asbestosis).

Washington—three years' exposure (all diseases).

West Virginia—two years' exposure (silicosis).

Wisconsin—90 days' (silicosis).

Another important provision is the requirement that the disease should have been due to the nature of the employment and contracted within a fixed period of time previous to the date of disablement. The following are examples of such provisions:

Michigan, Minnesota and Ohio — one year.

Illinois, Indiana, Nebraska, and Pennsylvania—two years.

North Carolina — three years (silicosis and asbestosis).

All of the compensation acts specify procedure relating to the filing of claims and fix the time after injury or last exposure within which claims must be filed, and in order to determine the rules of each state, it is necessary to examine the particular state statutes applicable thereto. These statutory provisions lack uniformity as to procedure, and unfortunately, in many instances, the period of limitations runs from the date of injury or manifestation of the disease rather than from the date of last exposure to the disease hazard. This is objectionable to the employer because he is unable to determine his liability in the case of diseases that do not manifest themselves or cause injury until many years after employment or exposure to disease hazard has been terminated. To determine liability, it is essential that the period of limitations run from the date of last exposure.

The refusal and reluctance of representatives of labor to recognize the necessity for physical examinations of employees has impeded the successful administration of these laws, but the question of limitation provisions could be readily solved by the physical examination of employees upon the termination of their exposure to disease hazards, whereby it could be promptly determined whether or not they have suffered disability.

Examinations of Employees

IN SPITE of the misunderstanding that has arisen regarding their use, pre-employment examinations have served a valuable purpose in avoiding the employment of men in certain industries having hazards to which they may be peculiarly susceptible, as for example, preventing the employment of tuberculars in those industries having silica hazards.

Periodic post-employment examinations have already proved their merit. They make it possible for employees to be advised of conditions not due to their employment that need treatment for the preservation of their general health. Competent medical advice is given, resulting in the treatment and cure of conditions which, undiscovered or unattended, might later cause irreparable damage to an employee's health. From the social standpoint, the benefits of examinations properly conducted may render to the employees invaluable assistance and the workman and his family, as well as the employer, will reap immediate and obvious benefits therefrom.

Accrued Liability Problem

AN INSTANCE of immediate interest is the provision of the Pennsylvania Occupational Disease Act that became effective January 1, 1938. The Pennsylvania law attempted to take care of the so-called "accrued liability" problem common to all occupational disease legislation as it related to certain diseases by apportioning this liability between the employer and the Commonwealth over a period of 10 years. By providing that if disability or death from the disease occurs within the first year after the Act becomes effective, the employer shall be liable for and pay one-tenth of the compensation for such disability or death, the remainder of such compensation being payable by the Commonwealth. For disability or death occurring each year thereafter, the employer assumes an additional one-tenth of this liability until the ten-year period is past, after which time full liability is

imposed upon the employer. The Act does not specify the diseases to which this provision applies, leaving this for the determination of the Workmen's Compensation Board. The Board is empowered to determine those diseases that develop to the point of disability only after five or more years of exposure. At the effective date of the Act, therefore, neither the employer nor his insurance carrier will be apprised of the diseases to which this provision applies.

It is apparent that such confusion must react detrimentally to all industrial interests and, in a sense, makes the risk imposed by the law uninsurable. Assuming that the disease of silicosis is one of the diseases that the Board will find to be within the terms of this section, we have a limitation of the employer's liability in the law in the amount of $3600.

Does the section providing for the apportionment of liability between the employer and the Commonwealth limit the employee's right to compensation to $3600, or does it mean that during the first year the Act is effective, the employer pays one-tenth of the disability or death benefits, not to exceed $3600, and the Commonwealth pays the remaining benefits granted by the general law? Such a construction is possible and would result in claimants becoming disabled the first year after the Act becomes effective receiving substantially more compensation than claimants becoming disabled ten years after the Act becomes effective. If this is the proper construction of the Act, I hazard the guess that during the first few years it is effective, there may well be an avalanche of claims.

Ad Nauseam

NEARLY 40 new plagues have been advertised by manufacturers during the last year, among them: Acid Blues, Bird-Cage Mouth, Bridge-Table Slump, Floor Pox, Headline Jitters, Lobsteritis, Prairie Squint, Radiosis, Transportation Fatigue, Vacation Figure and Five o'Clock Shadow.[1]

Occupational Dermatoses

THE Harvard School of Public Health, Boston, is conducting a course in occupational dermatoses in May.[2] Lectures will be given on the clinical manifestations, etiologic factors, diagnosis, treatment insurance and legal aspects. Clinics will be held at the Massachusetts General Hospital and various insurance companies. Visits to factories will be arranged so that students may study industrial processes and preventive measures. The number will be limited to 10. Further information may be obtained from the Harvard School of Public Health 25 Shattuck Street, Boston.

1. *Printer's Ink*, quoted in *Readers Digest*.
2. *J.A.M.A.*, April 23, 1938.

How an Industrial Nurse Aids Production

MARY T. MCCARTHY, R.N.
Nurse, The Carter's Ink Company

AT THE Carter's Ink Company the Industrial Health Department was established as a definite part of the production structure, and, as such, earns a profitable return on the investment. It is not an altruism of the management. Personnel constitutes one of the most important production tools, and maintenance and repair of this tool is the assigned responsibility of the Health Department.

A healthy worker is more efficient than a sickly one; and an organization of healthy workers, because of the greater efficiency of its components, has a decided competitive advantage over organizations which are not so fortunate. Regular attendance enables the management to plan and maintain efficient production schedules, and greatly reduces losses due to irregular or disrupted production. Reduction of frequency and severity of accidents lowers premiums on workmen's compensation insurance. These are the commercial justifications for the cost of operating a first-class health department.

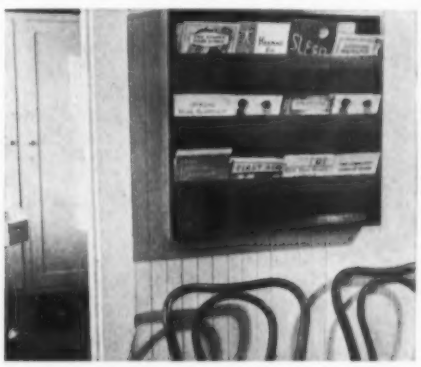
Prompt first aid treatment avoids the danger of serious complications

In discharging its responsibilities, the Health Department performs the following functions:

1. It improves the efficiency of employees by helping them to maintain sound health and mental peace,

2. It reduces losses by:

(a) Helping to find means of eliminating accident hazards,



Health literature enables workers to secure professional information without having it thrust upon them

(b) Minimizing the seriousness of accidents by prompt first aid treatment and supervised medical attention to all injuries,

(c) Speeding return to work of all injured workers as much as is reasonably practical,

(d) Securing complete records of all accidents, thereby providing evidence for defense against unjust or fraudulent law suits which may de-

This picture was posed to show how absences can disrupt production schedules—evidenced by the pile-up of unlabeled jars at end of belt

velop from industrial accidents.

The First Aid room at The Carter's Ink Company is provided with various equipment, instruments and medicines which enable the nurse to care for the cuts, abrasions, splinters, sprains, colds, headaches, stomach upsets, constipation, toothaches and eyestrains common in any industrial plant.

Visits by employees to the clinic for treatment or advice enable the nurse to give instructions and health talks on personal, plant and community hygiene. In the waiting room there is literature on various subjects connected with health and its preservation. This literature enables the workers to secure professional information without having it thrust upon them. They read what interests them, and their interest broadens as their knowledge extends. People can be guided along the road to health, but they cannot be pushed faster than they care to move. Many of the people take this health literature home with them for other members of their families to read.

Miss McCarthy served with the American Red Cross in France during the World War, returned to private practice after the Armistice. and then engaged in industrial nursing. She has made an extensive study of industrial medical practice

Part of the nurse's duties is to visit injured or ill workers in their homes. These visits enable her to check the patient's progress, and to give advice and, if necessary, actual nursing care. They provide an opportunity to observe conditions which are not conducive to good health, and to discover conditions which may cause worries to wear down the worker's health and to make his mind less attentive to his work, thereby making him more prone to have accidents. By a group insurance plan one common worry, that of future insecurity, has been greatly reduced. Advice and assistance are given individuals, according to the needs of each case, to help them cope with their particular private problems.

Regular follow-up of injured and sick patients makes certain that instructions of doctors are conscientiously followed. This avoids many disastrous results of negligence, such as infections, and speeds the return of workers to their jobs.

Poor health is sometimes due to poor diet. To encourage nutritious and well balanced lunches, there are attractive lunch rooms with facilities for preparing hot dishes. Employees may bring their own lunches or purchase wholesome foods at nominal prices in the lunch room store. All lunch and rest rooms are under the supervision of the Industrial Health Department which is responsible for the maintenance of hygienic conditions.

Girls' Lunch Room

The primary objectives of any good industrial health department are preventing injuries and building up and maintaining the health of the company's employees. This interweaves the work of the department with that of the Safety Committee so intimately that the two organizations must work hand in hand, each helping the other.

The nurse visits patients' homes to check progress, and to give advice and nursing care

Every accident is fully reported on forms provided by American Mutual. Part of the data is filled out by the foreman of the injured employee, part by the nurse, and part by the Safety Committee. We find that the nurse can secure from the injured person certain information which he will not give to his foreman. So by this method we are able to get more complete information than would otherwise be possible. In making out her part of the report, the nurse is constantly on the look-out for information which may suggest

Men's Lunch Room

FOREMAN'S REPORT OF ACCIDENT INVESTIGATION

For the Use of the Plant Safety Department

(This form does not take the place of the regular accident report to be sent to the insurance carrier, or any legal form required.)

1. Name of Injured Mary Brown 2. Date of accident November 29, 1937

3. How long employed on this or similar operation 4 Years | Date reported November 29, 1937

4. Nature and extent of injury Contusion and abrasion and slightly crushed finger.

5. Was First Aid given? Yes 6. If so, when, by whom? Nurse

7. As a result of your investigation state what conditions or circumstances made this accident possible. Describe in detail After machine was shut off by employee the lever moved - and employee's right index finger was caught between the machine and bottle on the automatic filling machine.

Special note to foreman: It is very important that a complete answer be given to question No. 7 above, and that you endeavor to give a CONSTRUCTIVE suggestion in answer to the following question:

8. Suggest what is necessary to prevent a similar accident I'd suggest we have the people who make this machine come in and do a finished job of overhauling.

9. What action have you taken? Have shut machine down and will not use until above action has been taken.

Signature of foreman John Jones Dept. Ink Date 11/29/37

REVIEW BY SAFETY COMMITTEE

Recommendations Mr. Jones reports machine repaired and in satisfactory shape. Recommend this be accepted.

R. Smith (See Jones for O.K.)

Signature of Secretary Robert Smith Date 1/11/38

REVIEW BY SUPERINTENDENT OR MANAGER

Special Orders

Signature Date

Every accident is fully reported partly by foreman, partly by nurse, partly by Safety Committee

some way to prevent recurrence of the accident, and to allocate responsibility for the accident.

Safety activities are conducted by the Safety Committee, composed of department heads, foremen and others. The committee meets regularly and discusses in detail past accidents and studies methods of reducing the number and sevirity of accidents. It investigates all accidents, discovers causes, and recommends methods of preventing recurrence. Machinery guards, goggles, masks and other safety equipment are frequently obtained as the result of discussions of the safety committee. This committee conducts educational campaigns to inform workers of hazards and how to avoid them.

One of the most inviolate rules of the company is that all injured workers report promptly for first aid treatment. This minimizes our accident losses, because the injured worker is afforded prompt treatment and the danger of serious complications, which sometimes develop from apparently trivial accidents, is avoided. Also, it makes it possible for the department to check the healing of all injuries to make sure that instructions are followed and to detect any unfavorable developments before they become serious.

Serious injuries and those where there is any possibility of complications developing are sent to our doctor or to the American Mutual clinic for thorough examination and treatment. This assures the minimum of delay in getting injured workers back to work, and has resulted in rehabilitation of workers who might otherwise have been permanently disabled.

The value of the work our Industrial Health Department and our Safety Committee do in reducing accidents is reflected in our rate. Our premiums, for a great many years, have been considerably less than the average for our industry. But this is only a small part of our savings. Production economies previously mentioned, due to healthy minds and bodies, regular attendance, small labor turnover, and, above all, confidence of the workers in the management which directs their industrial destinies—these are the rewards which amply repay a management for any efforts which it may exert in behalf of the safety and health of its employees.*

Girls' Dressing and Rest Room. Lunch and rest rooms are under supervision of the Industrial Health Department

Industrial Fatigue

AT A meeting of the London Branch of the Institute, held February 24, at the Overseas League, Dr. J. N. Langdon delivered a stimulating talk on industrial fatigue with particular reference to the psychological factors.**

As an example of the influence of the psychological factors in fatigue, he quoted the well-known experiment with the Ergograph, in which the subject, having apparently reached the limit of physical endurance is spurred to further activity by the information that the task has been lightened, whereas in fact no

* In *American Mutual Magazine*, April, 1938.
** In *Labour Management*, April, 1938.

alteration in the weight to be lifted has been made.

He quoted McDougall's equation:—the degree of fatigue is equal to

$$\frac{\text{the degree of resistance}}{\text{quantity of free energy}}$$

and pointed out that psychological factors are present in both numerator and denominator.

Illustrating his argument by typical work curves, Dr. Langdon stressed the importance of rest pauses in overcoming fatigue.

Rest pauses had been frequently opposed on a number of grounds: they were said to pamper the workers, who lost enough time already through unofficial breaks during the working period. Further, the rhythm of work was said to be interrupted, while piece workers complained that it prevented them from reaching full earning capacity. Dr. Langdon maintained that over and over again these charges had been found to be unsupported in practice. An official pause was much more effective than, and usually replaced, a number of unofficial breaks, while the swing of work was soon regained after a break, and in most cases piece-workers found they could easily make up for the time lost, through attaining a higher level of output after the pause.

Turning to the optimum time for inserting the break, Dr. Langdon said that this must be arrived at by studying work curves and inserting the pause shortly before the curve began to decline. Where the curve showed an early decline two or more breaks of less duration were probably more efficacious. Heavy work should be relieved by complete relaxation of effort, while in any sort of task opportunity should be given for change of posture from the normal working attitude.

After stressing the importance of physical environment such as good lighting and ventilation and of providing variety of work where this was practicable, Dr. Langdon turned to the problem of monotony. The incidence of monotony had increased with the growth of light industries, and it had been found in an investigation that even under good modern conditions about a quarter of the workers experienced more than the average degree of boredom.

In combating the influence of boredom correct methods of selection were stressed. A worker who was too intelligent for his job was just as useless as one who was not intelligent enough, since he was likely to become bored more rapidly, especially if he had been educated to expect a better job. Allowing workers to talk and sing at work was helpful, although talking might interfere with work, an objection not usually valid for singing. He praised the modern experiments.

CUMULATIVE INDEX

INDUSTRIAL MEDICINE

January to April, 1938, (inclusive)

Abdominal Cavity
—Most Dangerous Common Operations, by T. M. Aderhold, M.D., (February) 67

American College of Surgeons
—Minimum Standard for Medical Services in Industry, (February)..... 78
—See also "Blue Book of Industry."

Approval
—Certificate of, of Medical Service in Industry (March) 142

Basophilic Aggragation Test
—As an Early Diagnostic Factor in Lead Absorption and Incipient Lead Poisoning, by M. C. Hyler and W. R. Bradley, (April)..... 184

Blue Book of Industry
—An Independent Appraisal of the Work, and the Importance, of the American College of Surgeons in Industrial Medicine and Surgery (March) 131

Book Reviews
—Medical Service in Industry and Wormen's Compensation Laws, American College of Surgeons, (April) 201
(Review by Alice Hamilton, M.D.):
—Toxicology, by Wm. D. McNally, M.D., (April) 199
(by William D. McNally, M.D.):
—General Hygiene and Preventive Medicine, by John and Adolph Weinzirl (March) 130
(by C. O. Sappinton, M.D., Dr.P.H.):
—American Medicine—Testimony Out of Court (January)..... 40
—Clinical Roentgenology of the Cardiovascular System, by Hugo Roesler, M.D., (February)..... 81
—Crippled Children, by Earl D. McBride, M.D., (February)..... 81
—Diseases of the Nails, by Dr. V. Pardo-Castello (January)..... 40
—The Environment and its Effect Upon Man (January)..... 40
—Laboratory Diagnosis of Syphilis, by Dr. Harry Eagle (January)..... 39
—Management of Fractures, Dislocations and Sprains, by John Albert Key, M.D., and H. Earle Conwell, M.D., (February)..... 80
—Recent Advances in Industrial Medicine and Hygiene, by Dr. T. M. Ling, (February)..... 81
—Trauma and Disease, Drs. Leopold Brahdy and Samuel Kahn (January) 39
—Third Symposium on Silicosis, Saranac Lake, 1937, (April)..... 201
—Occupational Disease Symposium, Northwestern University Medical School, 1937, (April)..... 200
—Physicians' Vitamin Reference Book (Squibb), (April) 200
(by Frederick W. Slobe, M.D.):
—Injection Treatment of Hernia, by C. O. Rice (March) 129
(Review by W. F. von Oettingen):
—Toxicology, by Wm. D. McNally, M.D., (April) 200

Chest
—Acute Injuries of, by G. S. Baxter, M.D., (January)..... 26

Compensability
—Factors of, by E. C. Holmblad, M.D., (March) 125

Cuts and Lacerations
—Importance of Thorough but Gentle Treatment of, by C. S. Jernigan, M.D., (April) 193

Dermatoses
—Occupational, and the State, by Sir, E. Graham Little (March)..... 117

Dinitrophenol
—A Review of the Literature, by Maurice Hardgrove, M.D., (January) 9

Diseases
—Heart, by Wm. C. Stewart, M.D., (January) 42
—Occupational, Experience in, Retrospect 1937—Prospect 1938, by C. O. Sappington, M.D., Dr.P.H., (January) 23

Editorials
—Things Definite (January)..... 45
—Pre-Hiring Rehabilitation (February) 95
—Tension in the Teens (February)..... 96
—Industrial Health (February)..... 96
—We Add an Editor (February)..... 97
—Industrial Medical Meetings (February) 99
—Bad Hygiene (February)..... 99
—Progress in Education, (April)..... 216

Fistula
—Horseshoe, in Ano, by G. V. Pontius, M.D., (February)..... 69

Forms
—Medical Department, developed by American College of Surgeons (March) 148

Gonorrhea
—Management of, by Russell D. Herrold, M.D., (January)..... 5

Hearing
—Aids of, by D. M. Marcucci (January) 32

Hernia
—Autologous Fascia Suture Technique in the Surgical Treatment of Inguinal and Femoral, by R. C. Austin, M.D., (February)..... 74
—In Heavy Industry, by Frank R. Hirshfield, M.D., (February)..... 72
—Occupational, Prevention of by the Injection Method, by Louis H. Levy, M.D., (February)..... 75

Hypertension
—in Engine Drivers to come, by Nat. P. Brooks, M.D., (February)..... 61

Industrial Hygiene
—Course in, at University of Pittsburgh School of Medicine, Department of Industrial Hygiene, by T. Lyle Hazlett, M.D., (April)..... 194
—Outline of Course at University of Michigan, by Emory W. Sink, M.D., (April) 196

Injuries
—Acute, of the Chest, by G. S. Baxter, M.D., (January)..... 26
—Head, Their Surgical Management, by Richard Binion, M.D., (April)..... 178
—to the Knee Joint, by William G. Bessmer, M.D., (April)..... 204

Industrial Medicine
—and Compensation in Mexico, by Leopold Brahdy, M.D., (January)..... 46
—Organization of, by Aaron Samuel Leven, M.D., Dr.P.H., (January)..... 36

Kidney
—An Interesting, Case, by John P. Garner, M.D., (April)..... 183

Knee
—Injuries to the, Joint, by William G. Bessmer, M.D., (April)..... 204

Lead Poisoning
—The Basophilic Aggregation Test as an Early Diagnostic Factor in Lead Absorption and Incipient, by M. C. Hyler and W. R. Bradley, (April)..... 184

Medicine
—Modern, and Surgery, by W. J. Lancaster, M.D., (April)..... 175

Mexico
—Industrial Medicine and Compensation in, by Leopold Brahdy, M.D., (January) 17

Occupational Disease
—and the Industrial Nurse, by A. L. Brooks, M.D. (March) 154
—Definition (Goldberg Case) (March) 121
—Dermatoses, and the State, by Sir E. Graham Little (March)..... 117
—Experience in, Retrospect 1937—Prospect 1938, by C. O. Sappington, M.D., Dr.P.H. (January)..... 23

Sciatica and Fibrositis
—Historical and Recent Cults, Theories, and Facts as Etiology, Diagnosis, and Treatment, by Ferdinand Schmitter, M.D., (February)..... 82

Silicosis
—Tumor-Like Images in, by Conrozier and Magnin, Translation by Emery R. Hayhurst, M.D., (April)..... 179

Spine
—Lesions of the, by Edward L. Jenkinson, M.D., (January)..... 21

Surgery
—Modern Medicine and, by W. J. Lancaster, M.D., (April)..... 175

Syphilis
—Method of Control of, by H. A. Vonachen, M.D., (January)..... 41
—and the Worker, by R. R. Sayers, M.D., (January)..... 1

Tonsillectomy
—Suction, by J. B. N. Waring, M.D., (April) 208

Tuberculosis
—Collapse Therapy of, by Allan J. Hruby, M.D., (February)..... 63

Ulcer
—Gastric and Duodenal by Lowell D. Snorf, M.D., (January)..... 34

Venereal Diseases
—Management of Gonorrhea by Russell D. Herrold, M.D., (January)..... 5
—Syphilis and the Worker, by R. R. Sayers, M.D., (January)..... 1

Whiting, Frank V.
—"Relieved from Active Duty" (January) 33